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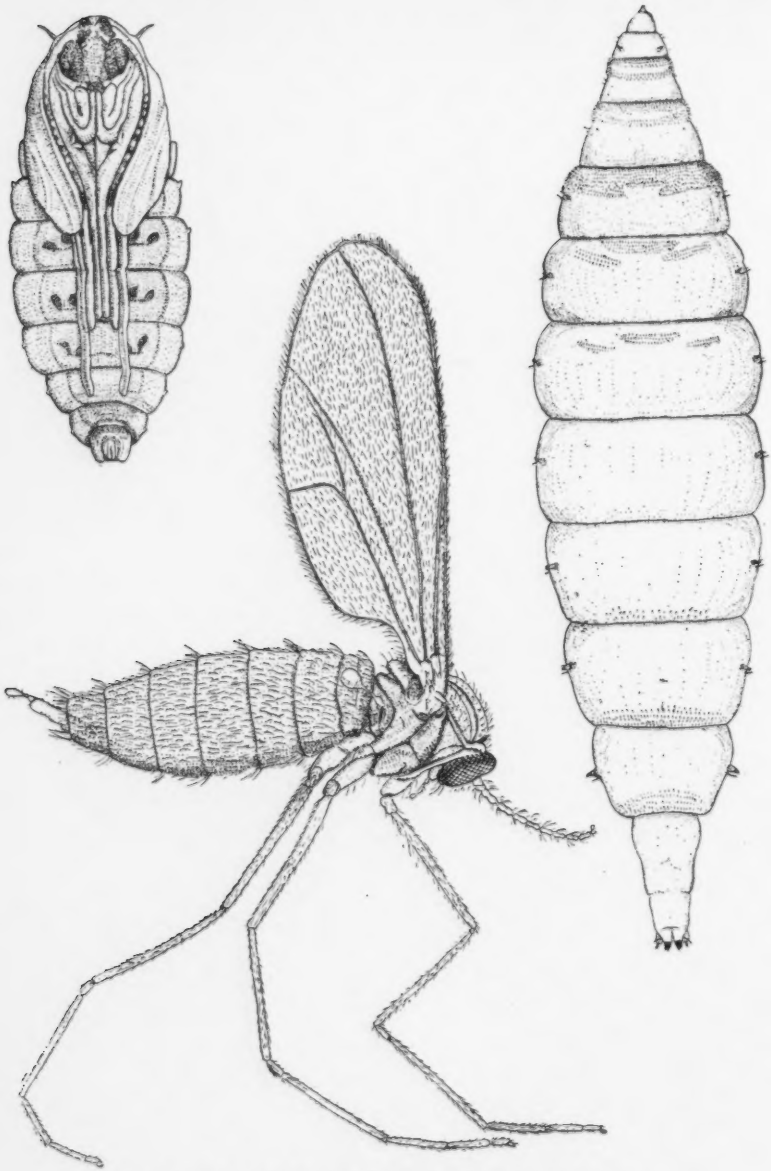

WILLIAMS ON CECIDOMYIA RESINICOLOIDES N. SP.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XX. JANUARY, 1909. NO. 1.

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The Montery Pine Resin Midge—Cecidomyia resinicoloides n. sp.

By FRANCIS X. WILLIAMS.

(Plate I)

This paper was written in the Entomological laboratory of Stanford University, and represents the biological* results of nearly a year's study of a new species of *Cecidomyia,* whose larva inhabits the resinous exudations of the Monterey pine (*P. radiata*) growing about the University.†

As little study has been made of pitch-inhabiting midges, living as they do under such peculiar conditions, the writer has endeavored to clear up as far as possible some of those points in the life-history of this insect, which in other species were doubtful or not fully brought out.

Our only described species of *Cecidomyia* comparable to the Monterey pine resin midge in general habits is *C.* (*Diplosis*) *resinicola* O. S. (9). Brief notes are given on the habits of the same. Comstock in his report for 1879 (2) gives a some-

* The anatomy which has been worked out by me is reserved for another paper.

† Later (June, 1908) I observed this insect in small numbers in the Monterey pine forests at Carmel, Monterey Co., Cal.

what longer account of its life-history, and Eckel (3) gives it still more in detail.

Felt (5) in an article on this species compiles largely from the last writer. Aside from a few notes by other writers, this is the extent of the literature relating to his eastern midge.

The Californian species recently found inhabiting the resinous exudations of the Monterey pine is somewhat larger than its eastern cogener, and differs from it in other respects, both in the larval and imaginal stage. I place this new species in the genus *Cecidomyia*, adopting the generic distribution of Kertész, which Aldrich uses in his "Catalogue of North American Diptera" (1905).

Cecidomyia resinicoloides n. sp.

Male. Length of body 4 mm., alar expanse 9-10 mm. Antennæ 2 plus 24 jointed, not much shorter than body, of dark color except scapus, which has grayish-red tinge; flagellum with small subglobular joints alternating with double subcylindrical ones; pedicels between the joints about equal to the diameter of the shorter joints, somewhat longer towards the end of the antennæ; joints verticillate, the length of the hairs of the verticils much longer than the shorter joints, and the longer ones slightly longer than the double joints; end of flagellum recurved dorsally almost into a circle.

Female. Length of body 5.5 mm., alar expanse 11 mm. Antennæ 2 plus 12 jointed, less than half as long as body, joints of flagellum subcylindrical, more than twice as long as broad, the basal ones longest; pedicels short, the hairs clothing the antennæ are slightly shorter than each single joint, with here and there one fully as long. Antennæ slightly upcurved. The black eyes in both sexes confluent above, occupying the whole surface of the head except a space around and below the antennae and a portion of the occiput, which parts are brownish red. Some recurved blackish hairs arising from occiput, also a small bunch on frons below antennae. Ground color of thorax grayish with slight brown or reddish-brown tinge (varying in intensity according to age) with the base of the wings and the sutures reddish, which color predominates generally in freshly emerged specimens, darkest on the dorsum with sparse bristly black hair, a row of which runs along a blackish stripe on each side of the median line of the scutellum, converging slightly posteriorly and then diverging and becoming more obscure. Viewed in another light this line is broken into an anterior and a posterior stripe and a short posterior median band. The light contrasting ground color brings out an apparent yellowish-gray stripe on

either side of the black dash, especially prominent outwardly. The pale hairs viewed against the body appear blackish. Abdomen reddish, somewhat darker on dorsum, in the female covered with coarse grayish or darker hairs with a few longer dorsal and ventral ones on the posterior part of each segment. Hairs proportionally longer and pale in the male, with a few longer dark ones on dorsum and venter as in female. Genitals pale; feet pale brownish, gray at base becoming blackish distally, with pale gray appressed pubescence; some longer and darker hairs on underside of femora. Halteres pale yellowish brown at base, darker reddish brown distally. Wings appearing smoky black owing to the numerous dark hairs covering them, fringes long and grayish; second longitudinal vein arcuate in its latter portion and ending immediately beyond apex. Described from several fresh males and females taken in the Stanford Arboretum, and now in the Stanford University Entomological collection.

Egg—.60 mm. long, elongate rounded at both ends, about three and one half times as long as wide, bright orange.

Mature larva—About 10 mm. long (but capable of much greater extension and contraction), width 2 mm.; fusiform, tapering more gradually caudad, somewhat wider than deep. Color bright orange, the stomach showing as dark brown and the Malpighian tubules as deep orange. 14 segments including the head which is very small, and which together with the supernumerary segment is often partially withdrawn into the following segment; segments 6 and 7 widest, 11 quite slender and appearing compound, 12 small, below 11 and deeply cleft. Breastbone elongate and varying considerably in form, somewhat incised anteriorly. Two large anal spiracles, and lateral ones on segments 1 and 4—10. Long transverse dorsal and ventral patches of short bristles, best developed anteriorly where they point caudad, posterior spines point cephalad. These bristles are no doubt used to assist in locomotion.

Pupa—Length 5 mm.; stout, orange red; thorax and appendages (with the exception of their free ends which are pale translucent with an orange tinge) darker; legs reaching nearly to end of 6th abdominal segment and free beyond the 2nd. A slender, curved yellowish-brown breathing tube behind each eye, with a rough, dusky, pointed cocoon-breaker at the base of each antenna at the angle formed by the vertex and frons. Thorax smooth and shining; abdomen duller and rougher; spiracles reduced.

LIFE HISTORY.

Owing to the unusually mild spring weather of 1908, *Cecidomyia resinicoloides* was probably on the wing somewhat earlier than usual. The first adult observed was on March

16th, which specimen, however, was bred in the warm laboratory. March 19th a specimen was taken resting on the trunk of a Monterey pine growing in the Stanford Arboretum, and a day later several of the midges emerged indoors. Early in April adults were plentiful, and one female was observed probing about rapidly with her long, slender ovipositor on a hard, dry resin nodule. No eggs were found here, however, but on the same day a few soft, oblong, orange-colored eggs were discovered in a fissure at the base of a rather soft, whitish lump of resin, which harbored a colony of *resinicoloides* pupae, Late in May a short search revealed numerous extruded pupal shells, no adults and but few eggs. No search was made for larvae in summer, but in September, 1907, many well-grown ones, scarcely smaller than mature larvae of spring, were found. It is quite likely that the insect is single-brooded, spending the greater portion of its life in the larval state. As with *C. resinicola* of the Eastern United States, our western resin midge has gregarious habits, the larvae numbering from a very few to more than fifty in the same nodule, which is always soft so long as the insects are feeding. Colonies of *resinicoloides* larvae were most commonly found in masses of pitch which exuded from places where limbs had been sawed off at the trunk, the bark closing around such wounds, frequently forming hollows where much resin accumulated, and thus furnished an ideal place for a colony of these insects. Smaller colonies were found in cracks in the branches filled with resin, and in small resinous globules on twigs. In no case did it seem probable that the larvae were the primary cause of the resinous exudation. Besides occurring on Monterey pine, a small colony of these larvae were discovered in a lump of resin on a *Pinus muricata* (?) growing in the Stanford Arboretum.

Several experiments were made with *resinicoloides* larvae to ascertain if possible whether they could make a prolonged stay completely buried in the resinous mass. Whenever larvae were covered with semi-liquid resin they worked they way to the surface if the resin had not become too hard, and brought

their anal spiracles to the surface of the mass. This was usually done within twenty-four hours, and those larvae, unable to work their way to the surface, eventually perished. Several mounted in Canada balsam lived in that medium for over a week, but their anal spiracles were exposed at the edge of the coverglass. It is evident that the larva must come to the surface for air, though this may be only at long intervals. It was difficult to observe the way in which the larva gets its air supply under natural conditions, owing to the opaqueness of the resin, but investigation showed that the insect always had its anal spiracles towards the surface of the nodule, at times in a hollow in the pitchy mass, and in other cases so deeply submerged in the medium that it seemed doubtful if the insect could extrude its terminal spiracles. A rule apparently quite constant was that soft resin harbored large larvae, while in the harder, often discolored medium these insects were shortened and of a reddish color, as if preparing for pupation. A lump of soft resin if hardened would always stunt the larvae within. These would often pupate, but without forming a cocoon.

Pupation does not occur until spring, and is probably dependent upon temperature. During winter many larvae formed pupal chambers and lay therein as abbreviated reddish prepupae. A note dated January 18th, 1908, states that fresh, soft resin harbored feeding larvae, while hard, crusted resin contained larvae in their pupal chambers, the latter being the more numerous. Another note of January 17th states that many larvae were observed still feeding, and that the shortened ones are to be found in the harder gum, reddened perhaps by excrement.

Before transforming the larva makes a cocoon of thin papery consistency, a good deal longer than the prospective pupa and with one end bulging from the resinous mass as a cap. A number of cocoons may be found in close proximity, so that their walls touch. In such cases they resemble somewhat the miniature comb of a social wasp. Whether the cocoon is spun by the larva was not determined; I am inclined

to believe that it is, since the cocoon is not of the same consistency as the surrounding medium, having a more papery texture. A few strands of silk-like structure are sometimes found about the pupal chambers. It is evident that the resinous cap is formed by the larva pressing the resin outwardly with its anterior part, possibly using the "sternal spatula" for the purpose.

On March 11th the first pupae were found, but there were still a few feeding larvae, the great majority, however, being in pupal chambers. These latter do not pupate immediately (except perhaps the late-maturing ones), but hibernate for some time before transforming. When the insect is near pupation the thoracic segments become differentiated from the following segments by contracting into a smooth cone, the inter-segmental grooves disappearing and the appendages becoming visible under the skin as alternate darker and paler portions, and the two extremities of the forming pupa separate from the enveloping exuvium. The process of shedding this exuvium was not observed; several pupae, however, were examined as they lay in their cells, and the larval skin was found clinging to the last two or three segments; other pupae were found to have the larval skin wholly removed, the spatula and head skeleton remaining with the cast exuvium.

The pupa is quite active, reminding one somewhat of that of a lepidopterous insect. As the midge develops the anterior portion of the pupa darkens, especially about the head, and at the proper time (two or three weeks) is extruded through the cocoon cap and the fly issues from its shell. The adults emerged mostly in April and early May, and were found to be more sluggish than *Cecidomyia* (*D.*) *pini-radiatae.*

A great diversity of habits exists among the various pine midges, and the making synonymous of forms of widely different habits seems to me open to question. *C. resinicola* as we have seen has habits quite similar to *C. resinicoloides,* its western representative, but *C. pini-inopis,* considered synonymous with *resinicola,* attacks the needles of *P. inopis* and pupates in a resinous cocoon on a needle.

C. pini-radiatae lives at the base of the needles of Monterey pine, which become stunted and swollen as a result of its attacks, and pupates within the fascicle. This refers to *C. pini-radiatae* about Stanford University, for in Golden Gate Park, in San Francisco, apparently the same species produces no swelling of the pine needles (which, however, turn yellow), while the pupa of the latter is enclosed in a resinous cocoon which is often fastened externally to the scales at the base of the needles. The fact that the Golden Gate Park *C. pini-radiatae* neither stunt nor swell the needles was discovered by Snow (11). On the European pines are found several species of midges with habits corresponding to those of our North American *Cecidomyidae*. Much interesting work remains to be done with these insects.

C. resinicoloides was found to be singularly free from parasites, as but two examples of a chalcid fly (which is evidently the *Syntasis diplosidis* that preys upon *C. resinicola*) were obtained from the many larvae and pupae reared to maturity.

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EXPLANATION OF PLATE I.

Fig. 1.—Adult, ♀.
Fig. 2.—Pupa.
Fig. 3.—Larva
} all greatly enlarged.

Some new Bees of the genus Coelioxys.

By T. D. A. Cockerell.

Coelioxys deani n. sp.

♂.—Length about 7 mm.; black, with the tegulae dark brown, and the tarsi obscurely more or less brownish; wings with the apical margin broadly dusky; nervures piceous, stigma dull reddish. Vertex dullish, with large irregularly-placed punctures; cheeks with much white hair, and below with a broad shining beveled space; eyes black, their pubescence only moderately long; face covered with white hair; antennæ entirely black; mandibles black; tongue and labial palpi bright ferruginous; mesothorax and scutellum shining, with large close punctures; scutellum with no median projection, its lateral teeth small and curved; anterior border of mesothorax with a practically continuous band of creamy-white scale-like hairs; posterior lateral corner of mesothorax with patches of white hair, and some in scutello-mesothoracic suture; spurs ferruginous; abdomen shining, with strong but well-separated punctures; hind margins of segments 1 to 5 with conspicuous narrow white hair bands; first segment with a weaker band round the edge of the basin; no other bands, but third and fourth segments with a little hair in the transverse depressions; fifth segment strongly toothed at sides sixth produced, and with a deep broad groove above, its teeth number six as usual but the upper apical ones are rudimentary. Among American species readily distinguished by its very small size, and the produced apical segment, which is longer than broad, if the breadth be counted from the *inner* bases of the lateral teeth. The apex of the

fourth ventral segment shows a minute notch. The interval between the apical teeth of abdomen is minutely black-haired. It is evidently related to *C. modesta* Smith, differing in the small size and the color of the legs.

Hab.—Boulder, Colorado, July 13, 1908 (*Paul M. Dean*).

Coelioxys sayi novomexicana n. subsp.

♀. Larger, length about 11½ mm.; legs, including the whole of femora and trochanters, bright ferruginous red; tegulæ bright red; clypeus strongly notched in the middle.

Hab.—Las Cruces, New Mexico, June (*Cockerell*). This is the New Mexico insect hitherto reported as *sayi;* it is at least a good subspecies, perhaps a species. Two specimens are before me, bearing numbers 955 and 167.

Coelioxys soledadensis n. sp.

♂. Length about 10 mm., black, the general surface bare, but *the white markings due to pubescence very conspicuous.* The face is covered with white hair; mesothorax with the white band in front broadly interrupted; a conspicuous but short band in scutello-mesothoracic suture; mesopleura margined with white; first three abdominal segments with broad apical bands, but no hair in the transverse depressions; first segment white at sides, and part way along the edge of the basin; fourth segment with a rather weak band in the basal depression, and the apical band very broadly interrupted in the middle; fifth with a broad basal band, slightly interrupted in the middle, and only minute lateral patches to represent the apical band; sixth with a very broad basal band. Head and thorax strongly and very densely punctured; *clypeus broadly and deeply emarginate in the middle;* eyes sage green, with short hair; flagellum dark ferruginous beneath; scutellum with no median process, the lateral spines long and moderately curved; *tegulae dark rufo-fuscous;* wings reddish, stigma ferruginous, nervures fuscous; *legs reddish-black, the tarsi distinctly reddish; spurs ferruginous;* abdomen rather closely punctured; fifth segment with distinct but short lateral spines; sixth short, with short lateral spines, and four short apical ones, the upper the shortest, the lower broad and subtruncate; apex of fourth ventral segment with two short dentiform projections. Resembles *C. grindeliae* Ckll., but has shorter hair on the eyes, differently shaped apical teeth on the abdomen, &c.

Hab.—Soledad Canon, Organ Mts., New Mexico, at flower No. 38, Aug. 15 (*C. H. T. Townsend*). Very likely parasitic on *Megachile soledadensis* Ckll., which was taken on the same day at the same place, though at a different flower. In the banding etc., it closely resembles the *Megachile.*

A Report on the Species of the Siphonaptera found within the Boundaries of the City and County of San Francisco, Cal.

By Carroll Fox Past Assist. Surgeon, U. S. P. H. & M. H. S.

The following species of fleas were observed during the examination of some 17,000 specimens obtained from mammals trapped within the limits of San Francisco. 14,273 specimens were examined from *Mus norvegicus*, 1842 from man and about 1,000 from other small animals, the names of which will be given under the host. The *Pulex irritans* seems to be a constant parasite of the skunk (*Mephitis occidentalis*) as of six specimens of that animal examined the *Pulex irritans* has been found more or less numerous on each one, while no characteristic species of flea has been encountered.

Genus **PULEX** Linnaeus.

Pulex irritans Linnaeus.

Hosts:—*Homo sapiens, Mus norvegicus, Mus rattus, Canis familiaris, Mephitis occidentalis.*

Genus **LOEMOPSYLLA** Rothsch.

Loemopsylla cheopsis Rothsch.

Hosts:—*Mus norvegicus, Mus rattus, Mus musculus.*

Genus **CERATOPHYLLUS** Curtis.

Ceratophyllus fasciatus Bosc.

Hosts:—*Mus norvegicus, Mus rattus, Mus musculus.* Twice taken from man, twice from *Mephitis occidentalis* and once from *Thomomys bottae.*

Ceratophyllus acutus Baker.

Host:—*Citellus beecheyi.* Taken once from *mus norvegicus.*

Ceratophyllus telchium Rothsch.

Host:—*Microtus californicus.*

Ceratophyllus ignotus Baker.

Host:—*Thomomys bottae.* Taken once from *Scapanus californicus.*

Ceratophyllus londoniensis Rothsch.
Host:—*Mus rattus.*

Ceratophyllus niger spec. nov.
(Closely related to *C. gallinae*).
Host:—Taken from an unused chicken yard and from sparrow's nests. Occasionally found on *Homo sapiens, Mus norvegicus.*

Ceratophyllus spec. nov.
Host:—*Mus norvegicus.*

Ceratophyllus spec. nov.
Host:—*Microtus californicus.*

Genus **CTENOCEPHALUS** Kolenati.
Ctenocephalus canis (Curtis) Baker.
Host:—*Canis familiaris.* Occasionally found on *Homo sapiens Mus norvegicus* and *Mus rattus.*

Ctenocephalus felis Rothsch.
Host:—*Felis domestica.* Occasionally found on *Homo sapiens, Mus Norvegicus* and once from *Mephitis occidentalis.*

Genus **HOPLOPSYLLUS** Baker.
Hoplopsyllus anomalus Baker.
Host—*Citellus beecheyi.* Once taken from *Mus norvegicus.*

Genus **ODONTOPSYLLUS** Baker.
Odontopsyllus charlottensis Baker.
Host:—*Microtus californicus.*

Genus **CTENOPSYLLUS** Kolenati.
Ctenopsyllus musculi (Duges) Wagner.
Hosts:—*Mus norvegicus, Mus rattus, Mus musculus.* Once found on *Microtus californicus.*

Genus **HYSTRICHOPSYLLA** Taschenberg.
Hystrichopsylla spec. nov.
Host:—*Microtus Californicus.*

Genus **CORYPSYLLA** gen. nov.
Corypsylle ornatus spec. nov.
Host:—*Scapanus Californicus.*

Notes on the study of some Iowa Catocalae.

By R. R. ROWLEY, Louisiana, Mo., and L. BERRY, Vinton, Iowa.

On the first of June, several well-grown larvae of *Catocala parta* were found feeding on small-leaf willow by the Junior Author. When changed to a broader leaf species of *Salix* these caterpillars seemed to experience no inconvenience, but finished their larval life and pupated in due time. The "worm" is very dark brown, with longitudinal bands of lighter and darker brown. The mid-dorsal band of dark gray, forming a series of elliptical and rhomboidal expansions. The subdorsal bands are dark brown and wavy, with light diagonal lines crossing at the segment edges. A wide, gray line is below the subdorsal and a dark brown narrower line below, shaped like a string of elongate lunules. It is somewhat lighter below this band. The ventral side is pale gray, with the characteristic black spots. The true and pro legs are gray. The head, gray with a narrow intensely-black dash on the side. The head is somewhat bilobed above and slightly flattened as in *cara*. There is a hump over the 5th abdominal segment, as in *cara*, but dark brown in color. The top of the 8th abdominal segment has a cross ridge as in all the red-winged willow Catocalae. The tubercles are gray. The lateral row of setae or short bristles is as in *cara* and *amatrix*. The specimen described was two and a fourth inches long. Other larvae were obtained on the 8th. The larva of *parta* can be readily recognized by its very dark color and *cara* pattern.

One larva of *parta* taken on June 6th, in color and markings, recalled the caterpillar of *innubens*, but the band was narrow and black. The chrysalis of this larva produced on the 8th of July an unusually dark imago. The larvae of not only *parta*, but of *amatrix* and *piatrix*, were found on the bodies of willow and walnut trees, not bushes, and from four to eight feet above the ground, the two former on willow, of course, and the latter on walnut.

The imagoes of *parta*, like those of *amatrix* and *relicta*, were plentiful throughout July, August and September in the

neighborhood of Vinton; but, unlike the other two, are wary and difficult to approach, taking wing at the slightest noise. More often, perhaps, than otherwise, the moth sits, head up, and ready to take wing. It may be said to be the rule that Catocalae rest with the head down; however *parta* seems to rest often with the head up and *relicta* always, but not in readiness of flight in the case of the latter, as it may be easily approached and even touched with the finger, so secure does it seem in its color protection on the light bark of aspen or its resemblance to a splash of paint or bird ordure, on willow or basswood.

The Junior Author's experience with the larvae of *piatrix* was like that of the Senior Author, all died. It seems that this is a very delicate species as a larva, and it is a little strange that imagoes are so plentiful, yet if one moth should come from every fifty or even one hundred eggs laid, there would be an abundance of *piatrix* in the woods, since a single female lays from eight to nine hundred eggs

The larvae of *parta* from Vinton, fed through to pupation at Louisiana, produced chrysalis early in June, at least not beyond the middle, and gave imagoes from the 1st to the 13th of July, making the pupal period about three weeks, the usual length of chrysalis life in the genus.

On the 18th of July the first larva of *Catocala amatrix* was formed on willow at Vinton, and on the 27th a much larger one on poplar, measuring three and three-fourths inches. *Amatrix* larva varies in ground color from light to dark gray. The middorsal dumbbell spots, light, inclosed by a dark-gray band. The lateral band below this is light gray. The spiracular band, dark gray and a series of long prostrate V's with the open end toward the head. Below, the body is light. The true and prolegs, light gray with minute dark dots which cover the whole body. The head is very light gray with a lateral black dash extending to the back, but not to the center of the back edge. Head small and with slight elevations or knobs above, as in *cara*. The top of the 5th abdominal segment, darker either side of a slight central hump as in *cara*.

Tubercles light at end but dark at base. The two tubercles on top of the 8th abdominal segment raised into a slight ridge. The hump over the 5th abdominal segment is gray instead of yellow, as in *cara*. The lateral row of setae of short but distinct bristles. A yellowish shade covers most of the ventral surface. The ventral spots are intensely black. On the side of the 6th abdominal segment, the lateral dark band of lunules is darkest. Head very small. The full grown larva is unusually broad or flat. The spiracles are almost black. The body bristles are few and very short. In the small, flat head, with its upper short, horn-like projections, the elliptical cross, hump over the 8th and 9th abdominal segments, *parta, cara* and *amatrix* agree, barring the color. The larva found on willow began spinning its cocoon on the 21st of July and pupated on the 26th. The chrysalis gave an imago of *C. amatrix var. nurus* on the 15th of August, lacking one day of having been a chrysalis, three weeks.

The imago from the larva taken on the 27th of July was a fine, large *nurus* and emerged on the 25th of August.

Catocala concumbens is not unusual in the middle part of summer at Vinton, but its larva has thus far escaped us, though willow, its reputed food plant, has been closely searched. A rarer moth, *C. cerogama,* and somewhat earlier, has also escaped us in larval form, despite the fact that linden has been under close observation.

Among the rarer forms at Vinton is a *Catocala* somewhat like *pura,* but a shade too dark and a species not unlike *hermia.* If there were enough variation in *Catocala unijuga* both of these forms might be considered varieties of that species, but *unijuga* itself is rare at Vinton.

To be seen in its beauty, *Catocala concumbens,* the daintiest of all the American species, must be bred, since even apparently fresh specimens are usually torn or rubbed. Its habits must be somewhat like those of *epione,* a species so difficult to get in a perfect condition.

We imagine the larva of *concumbens* is of the *cara* type, that is if it is a willow feeder.

C. ultronia and its several varieties are not uncommon at Vinton, while *vidua, epione* and *paleogama* are rare. *Habilis* is the only hickory feeder that is at all plentiful. Of course, *cara* is abundant. We are not attempting to mention all the species of *Catocala* that fly at Vinton, only the forms that came under our observation this year. The fauna is likely a full one.

The senior author of this article has been puzzled for two or three years over the variation in the larvae of *C. piatrix,* unable to bring to maturity the most striking forms and finding no variation in the imagoes, while we are able to demonstrate, in the case of *parta,* that the variation in the caterpillars does give variation in the moths. The normal larva has alternate longitudinal bands of lighter and darker color, while the most striking variation has a brownish-gray color, without any stripes except a narrow black dorsal band. The imago from this abnormal larva is distinct enough to be a variety and, probably is. We wonder if the variation in *relicta* and *amatrix* is noticeable in the larvae! We hope to have a chance to find out.

After the moth season had closed, the Junior Author carried the study of Catocalae to the food plants of the various species of the genus and busied herself with searches for ova, and she has been abundantly rewarded. Eggs of *cara, amatrix* and *parta* have been found under and between bits of bark from the height of four feet above the base to the very tops of the willow trees. Eggs of *ultronia* and, perhaps, *grynea* under the bark of plum, and after much searching, the ova of *relicta* on the outside of Aspen bark, with no protection against weather or foes unless they are color protected.

We were also very successful in securing eggs of the following species from two males confined in small tin boxes: *cara, amatrix, cerogama, relicta, amatrix* var. *nurus, relicta* var. *clara.*

Neogama is among the walnut feeders at Vinton, and, doubt-doubtless, as delicate a larva as *piatrix.*

Our notes on the resting places and habits of the imagoes

are as follows: *parta* either high or low, usually head up, much the wariest of Catocalae, hearing well, and taking flight at the snapping of leaves underfoot; *cerogama* low on linden, head down; *ilia* and its varieties occasionally on linden, oftener on oak, very sluggish; *neogama* and *palaeogama* on white oak and linden, rather low; *Ultronia* and its varieties on hickory and linden, rather low; *grynea* on linden; *amica* on oak and linden, *retecta* on oak, moderately low *concumbens* on elm and linden, at the very base of the tree; *pura* (?) on linden, both high and low; *relicta* on burr oak; *amatrix* on linden and elm. Both *amatrix* and *cara* are often found about porches, sheds and even on the side of the house. Mr. Dodge says *junctura*, like *cara*, is to be found about sheds. This is probably true of *walshi* also, while *luciana* takes refuge in holes in the bank, as deserted swallow nests, on the prairies of Nebraska, on the authority of Dodge again.

A *concumbens* was taken on the 16th of August on a very large elm tree, the lower part of which was moss covered. Some bits of the moss were torn off and in one of these places sat the moth hardly distinguishable from the bark.

Many good *amatrix, cara* and *concumbens* were taken on willow and aspen covered with *Ampelopsis* along the edge of a slough in an open place.

The first *relicta* were taken August 25th, low on aspen and white oak.

After a hot, dry spell of some weeks, it rained on the 28th of August, and after that there were more Catocalae about Vinton than at any time during the summer. *Relicta* was especially numerous. In addition to the latter, *cerogama, habilis, vidua palaeogama, retecta, piatrix, amica* and *grynea.* Most of these were fresh as if just from chrysalids. The fresh *relicta* were always near willow trees. On oak they look like lichens, on aspen they assimilate with the bark.

On September 4th several fresh specimens of *parta* were taken, a month or more after their first appearance.

Amatrix was very abundant in September, and specimens were taken on the 11th and 12th at the base of burr oak, elm

and linden, on the underside of leaning lindens and in openings of hollow trees.

The first *unijuga* was taken on September 5th. Quite all the species mentioned in this article were abundant from the 13th to the 15th of September. The supposed *hermia* was taken on the 16th of September and at the same time the woods were full of *amatrix*. The supposed *pura* were taken not later than August 2d. The last *parta* was seen on the 3d of October.

The egg of *Catocala cerogama* is small, almost black and smooth looking to the eye. Depressed spherical. Meridian plications small, low, smooth looking. But little flattened on the attachment surface. No well-outlined polar zone, a mere smooth surface without plications. The lateral plications or ridges bifurcate about the equatorial region, but there is no distinct zone there. In the sunlight the color seems to be a dark reddish black. The dark smooth look is the chief characteristic.

The egg of *Catocala relicta* of medium size, dark green, with a dark brown narrow equatorial zone. It is a slightly flattened sphere. There are about eighteen meridian striations that fork just above the equatorial zone. Polar region without plications and with two slightly ridge-like concentric circumferences. Very fine cross lines or parallels. Slightly flattened at attached pole. The egg of *Catocala concumbens* is of medium size, dark lead color. Eighteen strong meridian plications that bifurcate at the equatorial zone and with further implanted plications, giving many more than in the eggs of *relicta*. Depressed spherical. A little concave on attached side. Plications toward the pole strong and with deep depressions between. Free polar zone without ridge-like parallels or rims. The chief characteristics are the numerous plications in the equatorial zone.

The egg of *cara* is small, dark brown, with almost white hemispherical, faintly red-brown. Eighteen to twenty-two rather strong meridian striations, bifurcating at the narrow equatorial zone. The free polar region is a depression about a slight polar elevation. Flat on the attached surface.

The egg of *ilia* is large, slightly elliptical in outline, hemi- strong meridian plications, 18 in number. Polar zone a little flattened and with a slight rim, dark and looking like a hole to the naked eye. The plications bifurcate once or twice in the equatorial zone. Flattened on the attached side. The strong white meridian plications and the dark polar zone are the chief characteristics.

The egg of *ilia* is large, slightly elliptical in outline, hemispheric, dark brown, with a white equatorial line. Pole slightly tubercular, but the area is without a bounding rim. Meridian plications bifurcate near the equator and plications are implanted nearer the pole than usual in *Catocala* eggs. No distinct equatorial zone. Surface of attachment, flat.

A new species of Systropus (Bombylidae).

By Nathan Banks.

Systropus arizonicus n. sp.

Face whitish, mouthparts and antennæ black, thorax black, a yellow spot over base of each anterior coxa; a yellow stripe on each upper side from humerus to wings, expanded at each end, and in front with a narrow line passing down the front of thorax; a triangular yellow spot at posterior base of wings; and a smaller yellow spot at each posterior corner of the metanotum. Abdomen black at base and at tip, red in middle, the last three segments black above and below; the black of basal segment extending back on dorsum of next segment as a narrow dorsal line. Wings uniformly blackish, halteres brown. Legs black; the anterior and middle femora at tip and these tibiæ beneath yellowish; the apical fifth of hind femur, extreme base of tibia, and the first tarsal joint yellow. The second joint of the antennæ is about as long as the third; the upper branch of third longitudinal vein is angulate near base (not simply curved as in *S. macer*). Length.

From Palmerlee, Arizona (Biedermann).

Four of the Central American species, *similis*, *rogersi*, *rufiventris* and *sallei* have the first tarsal joint of hind legs pale as in this species. From all of these *S. arizonicus* differs in having the abdomen black at both ends. It is nearer to *S. similis* and *rogersi*, but both of these have the front legs yellow, and *similis* has a hoary median stripe on thorax, and in neither are the thoracic marks the same as in *S. arizonicus*. The three species of Karsch have black legs. The reference to these species in the Aldrich Catalogue is wrong; the journal is the Zeitschr. Ges. Naturw. (3) V, 1880. The *S. ammophiloides* of Townsend is a very different form.

A Revision of the genus Calospasta LeConte.

By F. CREIGHTON WELLMAN.

The genus *Calospasta* was founded by Leconte (Class. Col N. Amer., 1862, p. 273) with *Epicauta elegans* Lec. as type. While obviously related to *Tegrodera* Lec. and *Eupompha* Lec. yet the genus would appear to be a good one, bringing together what is, on the whole, a natural little group of species, although two forms hitherto included will have to be excluded (*vide infra*). The home of the genus seems to be the southern part of North America, especially southern California, though at least one species (*sulcifrons* Champ.) occurs in Mexico. In looking through the material referred to this genus in the United States National Museum and in the Philadelphia Academy of Natural Sciences some points of interest have come to light which are herewith presented.

My arrangement of the material which I have examined is as follows—this is not yet proposed as an entirely natural one, but as convenient in comparing the characters of the different species.

Genus **GYNAPTERYX** Fairm. et Germ.

Gynapteryx Fairm. et Germ, Ann. Soc. Ent. Fr., 1863, p. 260.
Gynapteryx Gemm. et Har., Cat. Col., vii, 1870, p. 2130.

1. **Gynapteryx opacus** G. Horn.

Megetra opaca G. Horn, Trans. Am. Ent. Soc., II, p. 139, ♀.
Calospasta opaca G. Horn, Proc. Cal. Acad. Sci., 2, IV, p. 438, ♂ ♀.

♂.—General form as in the genus *Tetraonyx Latr.*, entirely black, opaque, head and thorax rather smooth, antennae moniliform, elytra varying from punctate to coarsely scabrous, winged. Length 12 mm.

♀.—General form as in the genus *Megetra* Lec., black, opaque, head slightly punctured on occiput, thorax pentagonal, broader than long, sides obtusely angulate, elytra intricately rugose, apterous. Length 15 mm.

There seems to be no doubt but that these forms represent one species, although in the apterous ♀ the meso-coxae of course overlap the metasternum while in the winged male they do not. They have been taken together and *in copula* and I have before me 69 specimens (40 ♂'s and 29

♀'s) which seem to prove conclusively that we are only dealing with a remarkable sexual dimorphism. The species fits fairly well in Fairmaire and Germain's genus *Gynapteryx* to which I have referred it. The only character in which *M. opaca* G. Horn differs structurally from their diagnosis of *Gynapteryx* is in having unequal claws, and I am disinclined to propose a new genus on this character (which is easily misinterpreted) without an examination of the type of *Gynapteryx*, the which I would rather expect to show the claws subequal, just as we have one species of *Calospasta* (*C. viridis*) with the claws of nearly equal length. Dr. Geo H. Horn, on the occasion of the discovery of the ♂ ♂ of *"Megetra" opaca* by Prof. D. W. Coquillett, discussed the systematic position of his species but apparently was not acquainted with Fairmaire and Germain's genus, as he would certainly have referred to so remarkable a coincidence as a second species with apterous ♀, had he known of it. Horn after examining the ♂'s of Coquillett's collection now before me, placed *M. opaca* in Leconte's genus *Calospasta*. In doing this he remarks regarding his species, as did Fairmaire and Germain five years before regarding theirs, that such forms mark the transition between the Meloine and Lyttine groups of the family. The only other species of *Gynapteryx* is *flavocinctus* Fairm. et Germ., the type of the genus. It can be separated from Horn's species as follows:

♂.—Nitid, thorax coarsely punctate, elytra black, with yellow markings. **flavocinctus.**
Opaque, thorax almost smooth, elytra entirely black . . . . . **opacus.**
♀.—Head and thorax reticulated, elytra testaceous . . . . **flavocinctus.**
Head and thorax almost smooth, elytra black . . . . . **opacus.**

Genus* **PLEUROPASTA** Wellm., gen. nov.

A Calospastae Lec. *affinis sed differt caput inter oculus gibbosum, vertex valde rotundatus; elytrisque fortiter costatis. ♂ tarsi antici simplicibus.*

Species typica Calospasta mirabilis G. Horn.

Genus allied to *Calospasta* Lec. Head with vertex very

*πλερα, costae; πασσω, orno.

rounded, gibbous between the bases of the antennae; *antennae* as in *Calospasta,* very closely jointed, the articulations scarcely visible; *elytra* strongly costate somewhat as in *Pleuropompha* Lec.; anterior tarsi of ♂ simple.

2. **Pleuropasta mirabilis** G. Horn.

Calospasta mirabilis G. Horn, Trans. Am. Ent. Soc., 1870, p. 121.

Pale rufous except the antennae which are lemon yellow with rufous markings. Head oval, very rounded at vertex, gibbous between bases of antennae, with a few scattered punctures. Thorax oval, deeply impressed medianly. Elytra with margins reflexed and with four conspicuous, elevated costae on each elytron; ♂ front tarsi simple, but last ventral segment emarginate. Length 9.5 mm.

Genus **CALOSPASTA** Lec.

Calospasta Leconte, Class. Col. N. Amer. 1862, p. 273.
Calospasta Horn, Trans. Amer. Ent. Soc., 1870, p. 92.
Calopasta Gemm. et Har., Cat. Col., 1870, p. 2147.

I am retaining in this genus twelve species including one that is new. These may be separated as by the following table.

Spurs of hind tibiae similar.
  Spurs of hind tibiae slender and pointed.
    Face longitudinally impressed.
      Black, with yellowish red head and humera . . . . . **histrionica.**
    Face not longitudinally impressed.
      Thorax longitudinally impressed.
        Color green . . . . . **viridis.**
      Thorax not longitudinally impressed.
        Head and thorax punctate . . . . . **elegans.**
        Head and thorax smooth . . . . . **perpulchra.**
        Head punctate, thorax smooth . . . . . **decolorata.**
  Spurs of hind tibiae thick and truncate.
    Black, with yellowish red head and elytra . . . . . **schwarzi.**
Spurs of hind tibiae dissimilar, the inner slender and pointed, the outer thick and truncate.
    Face longitudinally impressed.
      Thorax punctate, with smooth space down middle. . . . **sulcifrons.**
    Face not longitudinally impressed.
      Entirely black.
        Thorax wider than long . . . . . **fulleri.**
        Thorax longer than wide . . . . . **moesta.**
      Black, with red thorax.
        Head and thorax punctulate and furnished with hairs. . **morrisoni.**
        Head and thorax smooth, without hairs . . . . **nemognathoides.**
      Red, with metallic elytra and venter . . . . . **wenzeli.**

3. **Calospasta histrionica** G. Horn, Pr. Am. Phil. Soc., xxix, 1891, p. 100.
Calospasta histrionica Champ., Mem., Soc. Ent. Belg., 1899, p. 169.

Black, rather nitid, head and humeri yellowish red; antennae filiform, joints rather closely articulated, head deeply impressed in median line; thorax longer than wide; elytra at base nearly twice as wide as thorax; first three joints of anterior tarsi of ♂ gibbous and deeply grooved longitudinally and last segment of abdomen slightly notched. Length 10 mm.

4. **Calospasta viridis** G. Horn, Trans. Am. Ent. Soc., 1883, p. 312.
Calospasta viridis G. Horn, Proc. Amer. Phil. Soc., xxix,, 1891, p. 100.

Green or bluish green, somewhat nitid, feebly pubescent; head sparsely punctate; antennae short, filiform with joints closely articulated; thorax not much wider than long, the median line somewhat impressed; elytra rugose; upper and lower portions of tarsal claws nearly equal; ♂ tarsi simple, last ventral segment emarginate. Length 7 mm.

5. **Calospasta elegans** Lec., Ann. Lyc. Nat. Hist., N. Y., v, p. 161.
Calospasta elegans G. Horn, Proc. Amer. Phil. Soc., xxix, 1891, p. 101.

Black with bluish tinge to elytra; head and thorax rather sparsely punctate; antennae filiform, joints rather closely articulated all the joints being longer than wide; a deep impression just above the clypeus; elytra dull blue-black with an irregular yellow vitta on each, starting from humerus, interrupted near apex; anterior ♂ tarsi somewhat dilated, especially the first joint, and last ventral segment of abdomen feebly emarginate.

Var. *humeralis* G. Horn, Trans. Amer. Ent. Soc., 1870, p. 93, Proc. Amer. Phil. Soc. xxix, 1891, p. 101.

Elytral vitta reduced to a triangular humeral spot. Length 11 mm.

6. **Calospasta perpulchra** G. Horn, Trans. Am. Ent Soc., 1870, p. 92.
Calospasta perpulchra G. Horn, Proc. Amer. Phil. Soc. xxix, 1891, p. 101.

Dark blue; head and thorax almost black, coarsely and sparsely punctate, thorax longer than broad; elytra nearly twice as broad as thorax, with three yellow bands interrupted at the suture; ♂ tarsi and last ventral segment as in preceding species, elytral coloration variable, ranging from almost confluent yellow markings to entirely blue elytra. Length 8½ mm.

7. **Calospasta decolorata** G. Horn, Proc. Cal. Acad. Sci., iv. 1894, p 437.
Calospasta decolorata Champ., Mem. Soc. Ent. Belg., 1899, p. 169.

Deep violet; head irregularly puctate, antennae short compact; thorax wider than long, coarsely punctate in ♀ almost smooth in ♂; elytra at

base wider than thorax, scabrous, reddish yellow in ♂, with oval piceous spot on middle of suture in ♀; last ventral segment of ♂ notched. Length 8 mm.

8. **Calospasta schwarzi** Wellm., sp. nov.

C. nigra; capite (oculis et oris partibus exceptis) elytrisque flavo-rufis. Caput inter oculus valde canaliculatum. Thorax angustus latitudine longior. Scutellum subtiliter rugulosum. Elytra oblonga, rugulosa. Pedes pallido-pubescentes, femora dense punctulata; ♂ tarsi antici articulis tribus primis gibbosis, longitudinaliter non sulcatis. Long. Corp. 8.5 mm. *Lat. elytr.* 3 mm.

Hab. Panamint Valley, California, *ab* A. Koebele, Apr., 1891, *collecta.*

Typ. Cat. No. 12,129, U. S. N. M.

Black, head (except eyes and mouth parts) and elytra yellowish red. *Head* almost smooth, very sparsely and feebly punctulate, longitudinally broadly channelled in front, vertex somewhat raised. *Antennae* not closely joined together, second joint very short, third distinctly longer than fourth, black except third joint has the upper surface of its basal half reddish. *Eyes as in histrionica* G. Horn. Last joint of maxillary *palpi* obliquely truncate. *Thorax* rather narrow, longer than wide, almost smooth, very sparsely and feebly punctulate and with a few minute scattered hairs. *Scutellum* triangular, finely rugulose. *Elytra* oblong, rather square at humeral and apical angles, rugulose, with a few very small white hairs *Legs* rather closely beset with small, fine pale hairs, the femora pretty densely punctulate. The first three tarsi of the ♂ front legs are gibbose but not excavated; under surface of body sparsely beset with pale hairs which are longer than those on the legs.

A very distinct species. Its closest ally is *histrionica* G. Horn from which it may be told at once by the ♂ anterior tarsi not being sulcate and by its concolorous elytra.

I take much pleasure in associating this interesting species with the name of Mr. E. A. Schwartz of Washington, D. C., to whom American coleopterology owes a great debt.

9. **Calospasta sulcifrons** Champ., Biol. Centr.-Amer., Col., iv, 2, p. 394.
Calospasta sulcifrons Champ., Mem. Soc. Ent. Belg., 1899, p. 170.

I have not seen this species. Champion's description gives the head and thorax as reddish yellow with vertex and median stripe to thorax black; elytra black with broad reddish yellow margin to base and sides; underside metallic. The head and

thorax are nitid, sparsely and finely punctured, the former medianly channeled, the latter with a rather broad impunctate space down the middle; antennae short, filiform; elytra nearly twice as wide as thorax, finely and rugosely punctured; anterior ♂ tarsi swollen and ferruginous, and sixth ventral segment emarginate.

10. **Calospasta fulleri** G. Horn, Trans. Amer. Ent. Soc., 1878, p. 59.
Calospasta fulleri G. Horn, Proc. Amer. Phil. Soc. xxix, 1891, p. 101.

Entirely black, opaque form as in *Tetraonyx* Latr., surface sparsely covered with rather long black hairs; head finely sculptured, antennae stout, filiform; thorax wider than long and as wide as head; elytra nearly twice as wide as thorax, scabrous, pubescent; anterior ♂ tarsi simple, last ventral segment triangularly emarginate. Length 9.5 mm.

This species at the first glance resembles the ♂ *Gynapteryx opaca* (*vide supra*) rather closely but can be separated as follows:

Pubescence long, first two joints of antennae hairy, thorax dull, almost smooth and impunctate . . . . . **G. opaca.**

Pubescence short, first two joints of antennae not hairy, thorax somewhat nitid, coarsely, irregularly and sparsely punctured. **C. fulleri.**

11. **Calospasta moesta** G. Horn, Trans. Am. Ent. Soc., 1878, p. 59.
Calospasta moesta G. Horn, Proc. Amer. Phil. Soc. xxix, 1891, p. 101.

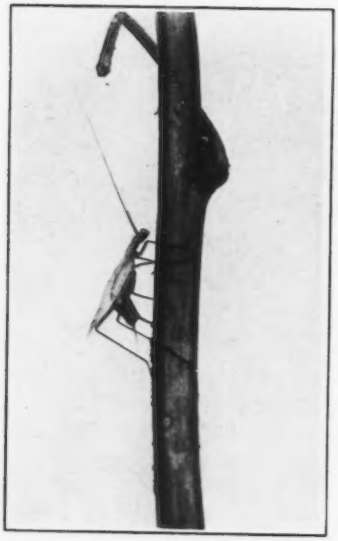
Black, nitid, elongate; head and thorax sparsely punctured; antennae thickened from within out, joints submoniliform; thorax longer than wide, elytra nearly twice as wide at base as thorax; anterior ♂ tarsi simple and last ventral segment feebly triangularly emarginate. Length, 22 mm.

12. **Calospasta morrisoni** G. Horn, Pr. Am. Phil. Soc., xxix, 1891, p. 102.
Calospasta morrisoni Champion, Mem. Soc. Ent. Belg., 1899, p. 170.

Black, thorax orange red, elongate; head and thorax sparsely punctate and beset with short black hairs; head usually with central rufous spot; antennae slightly thickened externally; joints moniliform; thorax scarcely longer than wide; elytra scabrous; anterior ♂ tarsi simple, last ventral segment broadly triangularly emarginate. Length, 13 mm.

13. **Calospasta nemognathoides** G. Horn, Tr. Am. Ent. Soc., 1870, p 92.
Calospasta nemognathoides G. Horn, Proc. Amer. Phil. Soc. xxix, 1891, p. 102.

Black, thorax red, moderately nitid; head and thorax smooth, not provided with hairs; antennae rather slender, joints not moniliform;



OVIPOSITION OF OECANTHUS QUADRIPUNCTATUS BEUTENMULLER.

thorax as wide as long; elytra rather feebly scabrous; anterior ♂ tarsi simple, last ventral segment deeply incised. Length 5.4 mm.

14. **Calospasta wenzeli** Skinner, Ent. News, 1904, p. 217.
Calospasta wenzeli.

Head, thorax, legs and upper part of body red; elytra and lower surface of body metallic green or blue; head smooth; antennae filiform; second joint short, third three times as long as second; thorax longer than wide; elytra strongly and peculiarly sculptured, the facets of which sculpturing give the insect a scintillating appearance; the whole insect beset, more or less closely, with white hairs; anterior ♂ tarsi simple, last ventral segment triangularly emarginate. Length, 10 mm.

Observations on the Oviposition of Oecanthus quadripunctatis Beutenmüller.

By J. P. Jensen,
Entomological Department, Cornell University.

(Plate II)

Oecanthus quadripunctatus has been considered by some writers a light form of *Oecanthus fasciatus* or *nigricornis*, but my observations on the habits of the two insects would seem to indicate a specific difference. The former deposits its eggs in a peculiar manner in raspberry and blackberry canes, if these are convenient, while *Oecanthus fasciatus*, also present, I have not seen oviposit similarly.

I first found a female of *Oecanthus quadripunctatus* ovipositing in the stem of a wild aster, late in the afternoon at Eagle Bend, Minnesota. The eggs were placed *singly* in the stem. In the same locality, during the month of September, I also found the females plentiful in a large patch of common thistles, and as they were on the leaves and stems of the thistles all day for several weeks and no other weeds were near, it seems probable that they also lay their eggs in the stems of these plants.

On October 5th, at 5:30 P. M., while searching for Oecanthids in a raspberry patch near Cornell University, I came upon a female in the act of ovipositing in a cane. She was placing her eggs in an irregular row up the stem and had already made

a dozen or more punctures. While actively at work ovipositing, the females are almost fearless. After watching one for some time she was caught, placed in a large bottle, with the piece of the cane containing the part that she was filling with eggs. The handling, no doubt, alarmed her considerably, for she laid no more eggs that evening. The next day she sat quietly under a leaf until about four o'clock, when she began running up and down the raspberry stem swaying her antennae and examining it carefully. In a few minutes she placed herself lengthwise on the cane and began completing the cavity that she had not been allowed to finish the preceding evening. She soon laid an egg, covered it, and began drilling another hole a little above and a little to one side of the last.

This took place in the Insectary of Cornell University and Professor Slingerland succeeded in getting an excellent photograph, shown in Fig. 1, of the interesting operation from life. The egg was laid in about twenty minutes, and as these insects are much more excitable after depositing an egg, the female became alarmed and after being replaced in the bottle could not be induced to continue for several hours. At 10:00 P. M. I noticed that she had been at work for some time. She had laid three or four eggs and was just in the act of covering the last one. Having finished this to her satisfaction, she began to prepare a place for the next just above and a little to one side, by tearing off pieces of the epidermis of the cane with her mouthparts and then gnawing a shallow depression. This took her about four minutes. Then advancing up the stem she felt for the place with her ovipositor and placed it in the depression almost at right angles to the stem, as shown in Fig. 1. The ovipositor seemed to slip, so she backed down to the place and gnawed the depression deeper. Again an attempt and another failure, but after gnawing deeper for the third time, it seemed satisfactory and active drilling commenced. This consists in pushing and swaying the ovipositor and abdomen back and forth the whole body working energetically, although the efforts are not as regular and forcible as in *Oecanthus niveus,* which generally lays its eggs *singly*

in the hard wood of trees, like cherry, peach and plum. After drilling into the cane to the full length of the ovipositor, the female widened the hole by swaying the ovipositor and abdomen from side to side and drilling out a cavity for the reception of the egg. The preparation of this receptacle took about eight minutes, but will, of course, vary with the hardness of the cane in that particular place, and also seems to vary with the temperature. On a cool evening it may take very much longer, as I have observed in this species and also in *O. niveus.*

When the cavity was finished, the ovipositor was taken out almost entirely, and except for a swaying motion of the antennae the insect sat perfectly still. The egg was being liberated. In about a minute the ovipositor was again inserted to its full length, and by very apparent contractions of the abdomen, the egg passed down through the ovipositor into the cavity. The ovipositor was then partly lifted out, and after gently crowding in the egg she began to cover it by drilling into the sides of the hole above the egg and pushing the material loosened down on the end of it and into the cavity above. This took two or three minutes. Then the ovipositor was taken out, and backing down to the opening, she commenced tearing loose the epidermis that she could conveniently reach, and mixing it with saliva, pushed the pieces into the opening. When it was filled, she piled more above it, sticking it on with the dark, salivary secretion. This took her four minutes, and she then began to prepare a place for the next egg.

The appearance of such oviposition work on the side of a raspberry cane is shown enlarged in Fig. 2, which also shows that the last hole drilled was left open, in fact did not receive an egg. This was found true of a great many series of punctures and seems to indicate that the female after making the cavity finds that she has already expended her supply of eggs.

In Fig. 3 a raspberry cane is cut open and shows the arrangement of the eggs inside. The eggs are golden yellow in color with a white granulated cap.

It will be of interest to economic entomologists to note that

our observations show this injury to blackberry and especially raspberry canes is due not to *Oecanthus niveus* but to *Oecanthus quadripunctatus*. Dr. C. V. Riley in his 5th Missouri Report, p. 119, after describing the injury and illustrating it by the figures that have had such general use in reports and text books ever since says: "These are the eggs of the Snowy Tree Cricket (*Oecanthus niveus* Harr.), an insect briefly described in my First Report." In the Supplement to his Ninth Report p. 60, he says: "*Oecanthus niveus*. This species is common in all parts of the country, and I have proved by breeding that the eggs are those described and figured as such in the 5th Report."

In the early summer, I caught a few individuals of *Oecanthus niveus* on raspberry and blackberry bushes in the evening, but most of them were on peach, plum and cherry trees and were already at that time busy laying their eggs *singly* in the stems and branches of these trees. In October no *O. niveus* specimens were to be found on the raspberry bushes while *O. quadripunctatus* was busy ovipositing in the canes. Each afternoon I would find one or two of them at work, while *O. niveus* was still ovipositing in the stems of the trees and they outnumbered *O. quadripunctatus* at least 100 to 1. It seems, therefore, that *O. niveus* is innocent of the injury resulting from the long rows of egg-punctures in berry canes, and that we must consider *O. quadripunctatus* the only culprit at least until *O. fasciatus* or *nigricornis* has been found guilty of the same offense.

Two new North American Phloeothripidae.

By J. Douglas Hood, Urbana, Ill.

The present paper is based upon a collection of *Thysanoptera* made in Southern Illinois during the past few months by Mr. Lindley M. Smith, Assistant to the State Entomologist of Illinois. As the collection is large and fairly exhaustive, representing many hours of careful collecting, I take especial

pleasure in naming one of the species for Mr. Smith. I am also greatly indebted to Prof. Forbes for numerous courtesies and privileges.

Genus **TRICHOTHRIPS** Uzel, 1895.

Trichothrips smithi sp. nov.

Figs. 1 and 2.

Female—Forma aptera.—Length about 1 mm. General color (by transmitted light) yellowish brown, with maroon hypodermal pigmentation; tube pale yellow, tipped with gray; tarsi and antennal segments 1 and 2 pale yellowish, the latter darkened laterally with blackish brown.

Head fully as wide as long; cheeks sub-parallel in basal half, anteriorly converging to eyes; dorsal and lateral surfaces sparsely and briefly spinose, faintly striate; postocular bristles slender, pointed. Eyes reduced, about three facets forming the lateral profile. Ocelli wanting. Antennæ stout, about twice as long as head; segments 1 and 2, and base of 3, pale yellow, shaded with darker; remainder of antenna dark blackish brown; segment 3 sub-conical; 4-7 sub-globose, pedicellate; 8, lanceolate, pedicellate; sense cones slender; formula* 3, I-I; 4, I-I; 5, I-IxI; 6, I-IxI; 7 with one on dorsum near apex. Mouth cone short, reaching about two-thirds across prosternum; labium broadly rounded at apex; labrum narrowed apically; just attaining tip of labium.

Prothorax about as long as head, and (including coxæ) about twice as wide as long; all spines present, rather short, sub-acute. Pterothorax about as long as, and slightly narrower than, prothorax. Wings wanting. Legs about concolorous with body, excepting tarsi and apices of tibiæ, which are pale yellowish; fore tarsi armed with a small acute tooth.

Abdomen slightly wider than prothorax, narrowing roundly from segment 5 to base of tube. Tube about .6 as long as head, and slightly more than 1.4 times as long as its basal width; terminal bristles longer than tube.

Measurements:—Total length 1.0 mm.; head, length .155 mm., width .158 mm.; prothorax, length 1.47 mm., width (including coxæ) .30 mm.; pterothorax, width .28 mm.; abdomen, width .33 mm.; tube, length .09 mm., width at base .063 mm., at apex .033 mm. Antennæ: 1, about 25μ; 2, 46μ; 3, 49μ; 4, 42μ; 5, 42μ; 6, 41μ; 7, 36μ; 8, 43μ; total .32 mm.; width 34μ.

*In the formula for the antennal sense cones, the number of the antennal segment is followed, first, by the number of sense cones on its inner surface, and then by the number on its outer surface; rudimentary cones are expressed by an exponent preceded by a plus sign. Thus 5, I - IxI means that on the fifth antennal segment there is one fully developed sense cone on either side, with an additional rudimentary one on the outer surface.

Described from two apterous females taken on hard maple (*Acer saccharum*) at Bosky Dell, Illinois, October 20th, 1908, by Lindley M. Smith, to whom the species is respectfully inscribed.

This little species is closely allied both to *T. americanus* m.* and *T. angusticeps* m.†, resembling them very closely in general appearance and in the form of the antennal segments. These three species form a compact group, easily distinguishable from all other described North American species of the genus by the form of the eighth antennal segment, which is conspicuously lanceolate and narrowly pedicellate. The following key will facilitate the separation of these three species:

A. Head one-quarter as long as wide; bristles slightly dilated at apex; intermediate antennal segments oblong, pedicellate, antennal segments 3 and 4 each with two sense cones on outer sub-apical surface; tube 6 as long as head. Length 1.4 mm. **T. angusticeps** m.†

AA. Head about as long as wide; all bristles pointed.

a. Head slightly wider than long; intermediate antennal segments subglobose, pedicellate; antennal segments 3 and 4 each with a single sense cone on outer subapical surface; tube .6 as long as head. Length 1.0 mm. . . . . **T. smithi** sp. nov.

aa. Head slightly longer than wide; intermediate antennal segments oblong, pedicellate; antennal segments 3 and 4 each with two sense cones on outer subapical surface; tube nearly as long as head. Length 1.7 mm. . . . . **T. americanus** m.*

Genus **PHYLLOTHRIPS** m., 1908.

Phyllothrips umbripennis sp. nov.

Fig 3.

Female.—Length about 1.9 mm. Color nearly uniform black; antennal segments 3 and 4, and basal half of 5, usually yellow; fore wings grayish black in basal half; hind wings clouded at base, and with a blackish longitudinal vein reaching about to middle; marginal abdominal spines black, prominent.

Head about 1.3 times as long as wide, widest across or just behind eyes, thence narrowing evenly to base; lateral and dorsal surfaces transversely striate, sparsely, briefly, and scarcely visibly spinose; postocular

*Bull. Ill. State Lab. Nat. Hist., Vol. VIII, Art. II, p. 366, fig. 3, a, b, and c; 1908.

†Loc. cit., p. 367, fig. 4, a and b.

bristles blunt, much shorter than eyes. Eyes large, prominent, finely faceted, not bulging. Antennæ twice as long as head; segments 1 and 2 concolorous with body, excepting apex of 2, which is paler apically; 3 and 4 nearly uniform bright yellow; 5 usually with basal half yellow; remainder of antenna dark backish brown; sense cones slender, scarcely visible; formula*: 3, 0 - 1; 4, 1 - 2; 5, 1 1 + 1; 6, 1 1 + 1; 7 with one on dorsum near apex. Mouth cone long, slender, surpassing base of prosternum.

Prothorax about half as long as head, and (including coxæ) nearly three times as wide as long; all spines present, blunt, the pair at the posterior angles longest. Pterothorax large, heavy, slightly wider than long, and wider than prothorax; sides nearly parallel, roundly converging posteriorly and anteriorly. Wings present, about attaining base of tube; fore wings black in basal half, of equal width throughout, and with the sub-apical fringe on posterior margin double for about thirteen hairs. Legs moderately slender, black; fore tarsi unarmed.

Abdomen large, slightly wider than pterothorax, tapering roundly from segment 6 to base of tube. Tube about .6 as long as head, tapering evenly from base to apex.

Measurements:—Total length 1.94 mm.; length .27 mm.; width .21 mm.; prothorax, length .14 mm., width (including coxæ) .37 mm.; pterothorax, width .45 mm.; abdomen, width .51 mm.; tube, length .18 mm., width at base .082 mm., at apex .041 mm. Antennæ: 1, about 30μ; 2, 60μ; 3, 90μ; 4, 82μ; 5, 75μ; 6, 68μ; 7, 57μ; 8, 35μ; total .52 mm.; width 37μ.

Male.—Similar to female but smaller and more slender (length about 1.7 mm.).

Described from many specimens of both sexes, from the following localities: Illinois—Bosky Dell, Carbondale, Dubois, Pulaski, on various species of oak (L. M. Smith); Michigan—Baldwin, on white oak (J. D. H.).

This species is intermediate in structure between *Liothrips* (*?*) *ocellatus* m.† and *Phyllothrips citricornis* m.‡ It may readily be distinguished from its congeners by means of the following key:

A. Head not more than 1.3 times as long as wide (Fig. 3).
  a. Forewings brownish at extreme base; head about 1.15 times as long as wide; marginal abdominal bristles yellowish; tube .8 as long as head. . . . . **P. (?) ocellatus** m.†

*See note on first page of this Article.

†Bull. Ill. State Lab. Nat. Hist., Vol. VIII, Art. II, p. 375; 1908.

‡Can. Ent., Vol. XL. No. 9, p. 305, Fig. 15; 1908.

aa. Forewings nearly black in basal half; head about 1.3 times as long as wide; marginal abdominal bristles nearly black; tube .6 as long as head . . . . . **P. umbripennis** sp. nov.

AA. Head about 1.5 times as long as wide (Fig. 4).

b. Antennae lemon-yellow; prothoracic bristles large, rather prominent; mid-laterals present, fully as long as anterior marginals. **P. citricornis** m.†

bb. Antennae with segments 4-8 nearly black; prothoracic bristles small, inconspicuous; mid-laterals wanting. **P. aspersus** Hinds.‡

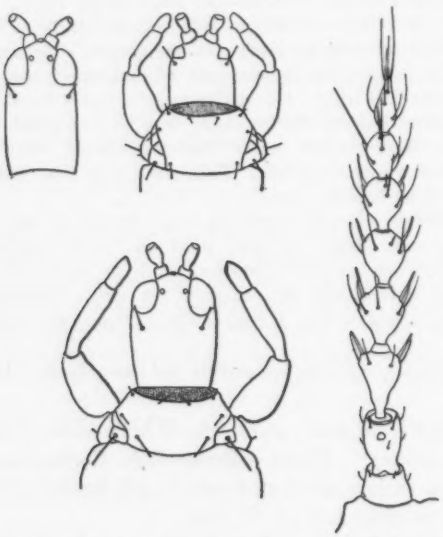


Fig. 1.—*Trichothrips smithi*, female, head and prothorax; x67.
Fig. 2.—*Trichothrips smithi*, female, right antenna; x206.
Fig. 3.—*Phyllothrips unbripennis*, female, head and prothorax; x67.
Fig. 4.—*Phyllothrips aspersus* Hinds, female, head; x67.

THE meetings of the Association of Economic Entomologists and the Entomological Society of America just closed in Baltimore, Md., were largely attended and very successful. There were many interesting papers read.

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†Can. Ent., Vol. XL, No. 9, p. 305, fig. 15; 1908.

‡Proc. U. S. Nat. Mus., Vol. XXVI, p. 205, Pl. X, figs. 104-106; 1902.

List of Moths Observed at Raleigh, N. Carolina.

By C. S. BRIMLEY.

This list is based mainly on moths collected during the past four years and is supplementary to the "List of Sphingidae, Saturniidae, and Ceratocampidae," published by myself in "Entomological News" for April 1904.

About 130 species have been identified by Dr. H. G. Dyar of the U. S. National Museum, and about half a dozen by Dr. H. Skinner of the Academy of Natural Sciences of Philadelphia, to both of whom I am very much indebted for their kindness in so doing. The remaining species comprising most of the most conspicuous or commoner forms have been mainly named by myself from Dr. Holland's Moth Book.

A few species will be found with the remark, "Specimen in State Museum, no date." All these were collected by myself at Raleigh, before my friend Prof. Sherman had initiated me into the mysteries of how to properly label a bug. The nomenclature and sequence is that of Dr. Dyar's check list.

SPHINGIDAE

Sphecodina abootii Sw., June 19 and July 26, at sugar.
Sphinx drupiferarum S. & A., May 9, 1905.
Lapara coniferarum S. & A., May 29, 1907, one bred from pupa. Three larvae taken in fall of same year.

SATURNIIDAE

Hemileuca maia Drury., I saw one flying across my yard on Nov. 22, 1906, and Mr. Woglum took one four days later.

CERATOCAMPIDAE

Citheronia sepulchralis G. & R., May 25, 1906, a fine male picked up on side walk. July 4, of same year, bred a female from larva taken in the previous fall. About a dozen larvae taken in fall of 1906.

SYNTOMIDAE

Scepsis fulvicollis Hubn. Mid June to late October, common.

LITHOSIIDAE

Crambidia uniformis Dyar. July 5, 1907.
Hypoprepia miniata Hubn. May 23, 1903.
Illice kentuckiensis Dyar. Sept. 11, 1906, two on goldenrod flowers.

ARCTIIDAE

Eubaphe opella Grt. June 14, 1907.
Utetheisa bella L. Abundant, June to November.
Haploa lecontei Bdvl. May 31, 1906 in woods.
Ecpantheria deflorata Fab. Has only been taken in July and August. The over wintering larvae are commoner than the adults ever are.
Estigmene acrea Dru. Early May to early October. Overwinters in the cocoon.
Hyphantria cunea Dru. Abundant. Two brooded. Late April to mid-August.
Asia isabella S. & A. Sep. 19, 1905, one bred. The overwintering larvae are not rare.
Diacrisia virginica Fab. Early May to mid-September, common.
Apantesis arge Dru. Late May and from July to October.
Apantesis phyllira Dru. Taken in 1898 and on May 21, 1900.
Apantesis nais Dru. July to October.
Ammalo tenera Hubn. June and July, not common.
Halisidota tesselaris S. & A. July and August. Larvae common in fall.

AGARISTIDAE

Alypia octomaculata Fab. April and May, rare.

NOCTUIDAE

Apatela americana Harr. May and August. Have taken the larvae on maple.
Apatela hastulifera S. & A. July and August. Larvae on alder.
Apatela innotata Guen. July and August, not common.
Apatela morula Grt. July and August.
Apatela interrupa Guen. May, July and September.
Apatela lobeliae Guen. July to September, rather common.
Apatela spinigera Guen. August.
Apatela clarescens Guen. Late July to early September. Larvae on plum.
Apatela tritona Hubn. July and August, rare.
Apatela connecta Grt. July and August.
Apatela vinnula Grt. May and August.
Apatela afflicta Grt. August.
Apatela albarufa Grt. August
Apatela modica Walk. In May and again in July, August and September.
Apatela brumosa Guen. In May and from late June to mid-September. One of the commonest forms.
Apatela haesitata Grt. Late June to early September, common.
Apatela retardata Walk. July and August.
Apatela noctivaga Grt. May and again in July and August, not common.
Apatela xyliniformis Guen. May and again in July and August.
Apatela impleta Walk. Taken in the same periods as the preceding.

Apatela oblinita S. & A. Bred in May, taken in August. Larvae on smartweed.

Harrisimemna trisignata Walk. Have taken it years ago.

Microcoelia obliterata Grt. May and August, rare.

Polygrammate hebraicum Hubn. Specimen in State Museum taken by me, but no date.

Diphthera fallax H. S. August, rare.

Crambodes talidiformis Guen. August.

Platysenta videns Guen.. July to September.

Balsa malana Fitch. June to August.

Perigea vecors Guen. May.

Perigea epopea Cram. September and October, rare.

Perigea sutor Guen. July to October, common.

Oligia chalcedonica Hubn. May to November.

Oligia grata Hubn. June to November.

Hadena miseloides Guen. June to early September.

Hadena cariosa Guen. June 17, 1907.

Dipterygia scabriuscula L. July and August.

Actinotia ramosula Guen. July to September.

Pyrophila pyramidoides Guen. July to September, not common.

Prodenia commelinae S. & A. July to October. Common.

Prodenia ornithogalli Guen. June to October.

Laphygma frugiperda S. & A. Common. Late July to early November. Very common in 1906. I counted about 600 of these moths on five sugared trees on August 23, and they were present in the same numbers the next two nights. The same five trees were visited by about 300 on the night of Oct. 3.

Rhynchagrotis anchoceliodes Guen. October, not common.

Agrotis badinodis Grt. Late October, not common.

Agrotis ypsilon Rott. One of our most abundant cutworms. The adults have been taken from early June to late November.

Peridroma margaritosa Haw. and P. m. saucia Hubn. Another common cutworm. Adults from June to October.

Peridroma incivis Guen. Late June to late November. Larva feeds on grass.

Noctua c-nigrum L. early May to early June, and again from mid-August to mid-October. Not common.

Noctua lubricans Guen. Mid-July to mid-November.

Feltia subgothica Haw. Early October, rare.

Feltia jaculifera Guen. and var. herilis Grt. Both forms common in fall, from late August to late October.

Feltia annexa Treits. Possibly our commonest cutworm. Adult. have been taken from early June to late November.

Feltia malefida Guen. Mid-July to late October, not very common.

Paragrotis bostoniensis Grt. Oct. 9, 1906.

Paragrotis messoria Harr. Mid-August to mid-October.

Mamestra meditata Grt. Sep. 28, 1905.
Mamestra detracta Walk. June and August, not common.
Mamestra legitima Grt. August.
Mamestra goodelii Grt. Aug. 25, 1907.
Mamestra laudabilis Guen. Common on sugar. June and from late August to early November.
Nephelodes minians Guen. Late September to November.
Heliophila unipuncta Haw. Early May to early November without a break.
Heliophila subpunctata Harvey. Aug. 30, 1905.
Heliophila extincta Guen. Nov. 10, 1906.
Heliophila juncicola Guen. July 21 and in September, 1907.
Heliophila phragmitidicola Guen. Aug. 22, 1905, and July 5, 1906.
Orthodes crenulata Butler. July to October.
Cucullia asteroides Guen. One bred from goldenrod, Aug. 8, 1905.
Achatodes zeae Harr. June 17, 1907.
Papaipema nitela var nebris Guen. October, not common.
Scoliopteryx libatrix Linn. Oct. 24, 1906.
Choephora fungorum G. & R. Nov. 8, 1906.
Orthosia ferruginoides Guen. October and November.
Glaea sericea Morr. One on Oct. 24, 1906.
Chloridea virescens Fab. August 19, 1906.
Heliothis armiger Hubn. Mid-June to mid-October.
Schinia nundina Dru. On goldenrod flowers in August.
Schinia arcifera Guen. August and September.
Schinia marginata Haw. August and September.
Euthisanotia unio Hubn. Aug. 15, 1904.
Euthisanotia grata Fab. Double brooded. In May and again in July and August
Cirrophanus triangulifer Grt. Specimen in State Museum without date.
Plusia aerea Hubn. August and September.
Autographa biloba Steph. April and May, rare.
Autographa verruca Fab. August to early October, common on zinnias in gardens.
Autographa rogationis Guen. Late July to early October on zinnias, at dusk.
Autographa ou Guen. September.
Autographa brassicae Riley. August to October.
Autographa oxygramma Geyer. Common, August to October, have taken the larvae on goldenrod and bred the moths.
Autographa bosigera Walk. May, rare.
Autographa simplex Guen. August.
Ogdoconta cinereola Guen. May to early October.
Paectes abrostoloides Guen. August to October, common.
Paectes oculatrix Guen. Late July to early September, rare.
Marasmalus inficita Walk. Early August.

Alabama argillacea Hubn. Oct. 17, 22, 1903.
Anomis erosa Hubn. September and early October.
Scolecocampa liburna Geyer. July and September.
Amyna orbica Morr. October.
Pleonectyptera pyralis Hubn. July and August.
Phiprosopus callichtroides Grt. August and September.
Eustrotia muscosula Guen. May to August.
Eustrotia apicosa Haw. May to September.
Eustrotia carneola Guen. May to September.
Eustrotia aeria Grt. Aug. 8, 1907.
Galgula hepara Guen. June, July and November.
Xanthoptera nigrofimbria Guen. In May and from July to September.
Metoponia obtusa H. S. Aug. 14, 15, 1907.
Chamyris cerintha Tr. Late June to mid August.
Tarache biplaga Guen. July 25, 1905.
Tarache erastrioides Guen. Late June to August.
Tarache candefacta Hubn. August and September.
Fruva apicella Grt. Aug. 31, 1907.
Spragueia leo Guen. June to September, common.
Spragueia dama Guen. July to September.
Euherrichia mollisima Guen. Aug. 14, 1907.
Pangrapta decoralis Hubn. Aug. 8, 1907.
Homopyralis discalis Grt. May and from July to September.
Homopyralis contracta Walk. Same period as preceding.
Hypsoropha hormos Hubn. Late June to early September.
Drasteria erechtea Cram. June to early September.
Caenurgia convalescens Guen. June to September.
Meliopotis jucunda Hubn. April and again in July and August.
Catocala epione Drury. July.
Catocala lacrymosa Guen. August and October.
Catocala viduata Guen. July to September.
Catocala cara Guen. August and September.
Catocala amatrix Guen. August to October.
Catocala amatrix var. nurus Walk. Same dates as preceding.
Catocala ultronia Hubn. June and early July.
Catocala ilia Cram. June, July and Septembr.
Catocala innubens Guen. July.
Catocala piatrix Grt. Late July to early October, our commonest Catocala.
Catocala subnata Grt. Once in late August.
Catocala grynea Cram. June and early July.
Allotria elonympha Hubn. July and August, and once in May.
Euparthenos nubilis Hubn. July.
Panapoda rufimargo Hubn. July and August.
Parallelia bistriaris Hubn. May to early September.
Agnomonia anilis Dru. July and August.

Remigia repanda Fab. Late April to mid-May and again from July to September.
Phurys vinculum Guen. July and August.
Phurys lima Guen. Late April and early May and again in July.
Celiptera frustulum Guen. Early May and from late June to August.
Anticarsia gemmatilis Hubn. Oct. 27, 1906, Nov. 30, 1907.
Antiblemma inexacta Walk. April 28, 1907.
Strenoloma lunilinea Grt. June to September.
Zale horrida Hubn. In May and again in July and August.
Pheocyma lunifera Hubn. Late June to September.
Ypsia undularis Dru. August.
Homoptera lunata Dru. and var edusa Dru. Has been taken in March and from May to late November. I believe it hibernates as adult.
Homoptera calycanthata S. & A. July and August.
Homoptera obliqua Guen. May, July and August.
Epizeuxis americalis Guen. May and June.
Epizeuxis aemula Hubn. July, August and October.
Epizeuxis lubricalis Geyer. May to early October.
Epizeuxis denticulalis Harvey, June, August and September.
Zanclognatha obscuripennis Grt. May to July.
Zanclognatha lituralis Hubn. July and August.
Renia discoloralis Guen. August.
Renia flavipunctalis Geyer. August.
Bleptina caradrinalis Guen. May, July, August.
Heterogramma pyramusalis Walk. August.
Palthis asopialis Guen. August to November.
Palthis angulalis Hubn. July.
Bomolocha manalis Walk. July.
Bomolocha bijugalis Walk. June and August.
Bomolocha abalinealis Walk. August.
Bomolocha toreuta Grt. July.
Plathypena scabra Fab. July to January. Overwinters as adult.

NOTODONTIDAE

Apatelodes torrefacta S. & A. Aug. 17, 1904.
Melalopha inclusa Hubn. May and July. Larvae very common on willow in fall.
Datana ministra Dru. Larvae very common on oak in fall.
Datana integerrima G. & R. Larvae observed on hickory, pecan and black walnut, in July and again in September, 1907.
Datana contracta Walk. Larvae usually common on oak in fall.
Nadata gibbosa S. & A. Late July.
Nerice bidentata Walk. Bred from larva on birch June 25, 1905.
Symmerista albifrons S. & A. May and August. Larvae very common in fall on oak.
Dasylophia anguina S. & A. July.
Heterocampa obliqua Pack. Early July.

Heterocampa manteo Dbl. June and July.
Heterocampa bilineata Pack. July.
Schizura ipomeae Dbl. July and August. have taken the larvae on horse chestnut and apple.

THYATIRIDAE

Pseudothyatira cymatophoroides Guen. August and early September.
Pseudothyatira expultrix Grt. Same time as preceding but commoner.

LASIOCAMPIDAE

Malacosoma americana Fab. Early May and June.

PLATYPTERYGIDAE

Eudeilinea herminiata Guen. May 7, 1907.
Oreta rosea Walk. Aug. 25, 1907.
Platypteryx arcuata Walk. Two bred from larvae on birch, Sep. 1 and 5, 1906.

GEOMETRIDAE

Eudule mendica Walk. July.
Heterophleps triguttaria H. S. July and August.
Tephroclystis (sp) August and September.
Eustroma diversilineata Hubn. June to August.
Percnoptilota fluviata Hubn. Sep. 27, 1907.
Hydriomena latirupta Walk. July and August.
Gypsochroa sitellata Guen. September and October.
Cosymbia pannaria Guen. Sep. 21, 1907.
Synelys restrictaria Walk. June 20, 1907.
Eois demissaria Hubn. Aug. 31, 1907.
Eois ossularia Hubn. Sept. 9, 1907.
Chlorochlamys chloroleucaria Guen. Sep. 21, 1907.
Synchlora denticulata Walk. August and September.
Anaplodes remotaria Walk. August and September.
Orthofidonia vestaliata Guen. July 10, 1907.
Sciagraphia atrofasciata Pack. August.
Philobia notata Linn. July and September.
Catopyrrha coloraria Fab. July.
Tornos scolopacinarius Guen. August and September.
Cleora pampinaria Guen. Common in May and from July to early September.
Epimecis virginaria Cram. April 19, 1904.
Therina athasiaria Walk. Late March to early May.
Xanthotype crocataria Fab. June to September.
Hyperitis amicaria H. S. April, May and August.
Gonodontis hypochraria H. S. Late August.
Gonodontis obfirmaria Hubn. Early April.
Euchlaena effectaria Walk. July.
Euchlaena amoenaria Guen. July and August.
Euchlaena astylusaria Walk. Late July.

Azeline ancetaria Hubn. July and August.
Caberodes confusaria Hubn. June to September.
Sabulodes transversata Dru. July.
Abbotana clemataria S. & A. July 7, 1907.

NOLIDAE

Celama sorghiella Riley. Sep. 6, 1907.
Nigetia formosalis Walk. June, August and September.

COCHLIDIIDAE

Sibine stimulea Clem. July and August.
Euclea delphinii Bdvl. July 1, 1907.
Lithacodes fasciola H. S. July 21, 1907.

MEGALOPYGIDAE

Lagoa crispata Pack. June and July.

PYROMORPHIDAE

Acoloithus falsarius Clem. June and August.
Pyromorpha dimidiata H. S. May.
Harrisina americana G. M. June and August.

THYRIDAE

Thyris maculata Harr. June and August.
Thyris lugubris Bdvl. June.

COSSIDAE

Prionoxystus robiniae Peck, June 11, 1902.

SESIIDAE

Melittia satyriniformis Hubn. Late June to mid-August. At least partially two brooded. I bred a number from the same years larvae in late July, 1905, but towards the end of August some of the cocoons still contained living larvae not yet transformed to pupae, although they had been a month in the cocoons.
Memythrus polistiformis Harr. July 18, 1905, a pair in coitu. Nov. 1, 1904, one.
Sanninoidea exitiosa Say. August.
Palmia ruficornis Hy Ed. Four taken in grass in pine woods Aug. 16, 1906.

PYRALIDAE

Glaphria sesquistrialis Hubn. June.
Hymenia fascialis Cram. August to October.
Desmia funeralis Hubn. June to September. At least two brooded.
Diastictis argyralis Hubn. August.
Pilocrocis inguinalis Guen. September on zinnia flowers at dusk.
Conchylodes platinalis Guen. August on zinnias at dusk.
Sylepta obscuralis Led. July.
Diaphania nitidalis Stoll. Late July to September.
Stenophyes horonalis Guen. Sep. 19, 1907.

Nomophila noctuella D. & S. June 17, 1907.
Loxostege mancalis Led. June to September. Two brooded. The larvae are a pest on morning glory vines.
Loxostege similalis Guen. August and September.
Phlyctaenia ferrugalis Hubn. Nov. 19, 1906.
Phlyctaenia tertialis Guen. June and August.
Cindaphia bicoloralis Guen. Aug. 2, 1907.
Pyrausta pertextalis Led. August and September.
Pyrausta theseusalis Walk. Aug. 30, 1907.
Pyrausta illibalis Hubn. July and August.
Eustixia pupula Hubn. June to August.
Aglossa cuprealis Hubn. July.
Hypsopygia costalis Fab. June, August and September.
Pyralis farinalis Linn. June to August.
Herculia olinalis Guen. June, August and September.
Galasa rubidana Walk. July 10, 1906, July 8, 1907.
Crambus praefectellus Zinck. June.
Crambus caliginosellus Clem. June.
Crambus teterellus Zinck. Sept. 10, 1907.
Diatraea saccharalis Fab. Early June, late July and August.
Argyria nivalis Dru. Sept. 8, 1907.
Epipaschia superatalis Clem. July 15, 1907.
Tetralopha humerella Rag. July 7, 1907.
Monoptilota nubilella Hulst. Aug. 2, 1907.
Ambesa busckiella Dyar. Aug. 14, 1907.
Meroptera pravella Grt. Aug. 14, 1907.

PTEROPHORIDAE

Oxyptilus tenuidactylus Fitch. June 15, 1907.
Pterophorus monodactylus Linn. Sep. 4, and Nov. 11, 1906.

TORTRICIDAE

Eucosma strenuana Walk. August.
Archips rosaceana Harr. June, August.
Platynota rostrana Walk. June 13, 1907.
Tortrix albicomana Clem. July.
Pharmacis sartana Hubn. July 17, 1907.

YPONOMEUTIDAE

Atteva aurea Fitch. September and October on goldenrod flowers.
Plutella maculipennis Curtis. June.

OECOPHORIDAE

Cryptolechia sparsiciliella Clem. July 16, 1907.

TINEIDAE

Acrolophus plumifrontellus Clem. June and July.
Acrolophus cervinus Wals. July.
Anaphora popeanella Clem. August and September.

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

To Contributors.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, three weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form, will be given free, when they are wanted; and this should be so stated on the MS., along with the number desired. The receipt of all papers will be acknowledged.—ED.

PHILADELPHIA, PA., JANUARY, 1909.

In Entomological News, volume XV, page 36, 1904, it was suggested to place on the cover of each January News, the most interesting American insect described during the previous year. It was our intention to have the describers of species apply to the News for this honor and the selection to be made by the editors in conjunction with the Advisory Committee. We have not had any applications and have left the space vacant for the present. We will be glad to receive application for this space; the application to be accompanied by a suitable drawing. If we do not receive any application for the space we will be compelled to abandon the idea.

MR. JACOB KOTINSKY has been appointed to succeed the late Mr. Alexander Craw as superintendent of Entomology of the Hawaiian Board of Agriculture, and Mr. D. B. Kuhns has been appointed assistant.

C. A. CLARK is conducting a *"Nature Experiment Station"* at Lynn, Mass., in which he has made hundreds of experiments with insects. Mr. Clark is one of the best known naturalists in Essex County, and has the only Experiment Station of its kind in his locality. His address is 60 Lynnfield street.

A TRUE STORY.—The minister was making a parishional call, and the youngest member of the family, a small boy of tender years, finally mustered sufficient courage to inquire his name: "My name," replied the clergyman pleasantly, "is Mr. Jehonnet, what is your name?" Astonished out of all prudence by so singular a name and convinced that the minister was "funning," he mastered his surprise as best he could and gravely replied: "My name is Mr. G. Bumblebee."

Doings of Societies.

The Brooklyn Entomological Society met at 55 Stuyvesant Avenue, October 1st with eighteen members present.

Prof. John B. Smith spoke of the summer's entomological happenings and remarked the steady northward progress of the *Sphecius speciosus* with a most noticeable cutting down of the prevalence of *Cicada*. The wasp has been common for at least twenty years along the centre of Long Island, burrowing in the loose sand by the railroad track. W. T. Davis who has been working over the *Cicada*, collected at Tuckerton, N. J., and got his principal supply by intercepting the female *speciosus* and stealing her prey. *Cicada canalicularis* was the species most frequently thus obtained. In the burrows tachinid larvae as secondary parasites infested a majority of the *Cicada*. C. V. Riley's familiar drawing in "Insect Life" was criticized inasmuch as it shows the wasp carrying the *Cicada* by the back. The wasp invariably grips the underside, holding the legs. After they fall to the ground the *Cicada* is pulled along, its back being smooth.

Mr. Geo. Franck and others described the flight of *Ennomos subsignarius* during the night of July 16. They were swept up by bushels and whitened the streets. Of thousands picked up, all were males. No one had observed the larvae as commoner than usual. The English sparrows destroyed vast numbers but did not eat them. They apparently picked off the wings in wanton mischief.

The great flight of 1862 was precisely similar. It was confined to the large cities and extended to Montreal. A plague of caterpillars followed the next year. Then, as this year, the females being heavier, stayed at home.

Of records of captures during the summer there was noted *Libythea bachmanni* at Bay Ridge, L. I.; *Pamphila phylaeus* at Canarsic, L. I. and Hopatcong, N. J.; *Thecla m-album* at Hopatcong, a northernmost record; *Lebia pleuritica* and *marginicollis* at Flatbush, L. I.; *Pamphila delaware* at Hopatcong. *Pamphila massasoit* was common in Orange County, N. Y. *Malachius aeneus* was common at Claremont, New Hamp-

shire. A very fortunate catch was a long series of *Cybister olivieri* in Florida. The last two are represented in very few collections.

R. P. Dow, *Recording Secretary.*

The Brooklyn Entomological Society met Nov. 5 with twelve members present and John A. Grossbeck of the Newark Society, a visitor.

G. W. J. Angell, a charter member of the incorporated society was re-elected, and C. P. Benedict of Staten Island elected to active membership.

A. C. Weeks reported *Hemileuca maia* at Gaphank, Oct. 18 by daylight. Jacob Doll reported taking *H. Neumoegeni* in Arizona freely at light at 11 P. M. C. J. Martin exhibited his summer's catch of beetles in Germany and Switzerland and a pair of *Catocala fraxini* with quite melanotic primaries.

Geo. Franck reported a freshly emerged *Philosamia cynthia* Nov. 5. The species had been unusually double brooded this year. Jacob Doll reported *Junonia coenia* hatching freely out of doors in November.

W. T. Davis reported that a larva of *Hemileuca maia* taken at Lakehurst, N. J. in the spring of 1907, which pupated promptly had emerged in the fall of 1908. Mr. Doll reported a *Samia gloveri* which recently hatched after being four years in the cocoon, and an *Atlacus orizaba* which had been in cocoon six years and is still alive. A number of other instances were given tending to show that in the arid regions of the southwest, insects had the power to stay in pupa form over a dry year and emerge in favorable climatic environment. C. Schaeffer reported taking the pupae of a Cerambycid *Monilema ulkei* in Arizona in the soil under the cactus, *Opuntia engelmanni.* These larvae surround themselves with an earthen cell. The cell bakes hard under the summer sun, so hard that it is seemingly impossible for the insect to emerge until a copious rain softens it.

C. H. Olsen showed a section of the stem of a decaying rub-

ber plant about one and a half inches in diameter, which while in a greenhouse had been penetrated through and through by four species of scolytid beetles.

At a regular meeting of the Feldman Collecting Social held this evening at 1523 South 13th Street, Philadelphia; the following members were present: Dr. Castle, Messrs. H. A. Wenzel, H. W. Wenzel, Seiss, Laurent, Schmitz, Harbeck, Haimbach, C. T. and G. M. Greene.

Vice-President Harbeck in the chair.

The absence of the Secretary at the beginning of the meeting prohibited the reading of minutes of previous meeting.

Mr. Wenzel, Sr. made several remarks on *Buprestis decora* and read extracts from a letter from Southern Pines, N. C. saying this species had emerged from pine in wood box in room in December. Coleoptera, the speaker said, often mature in the fall, hibernate in the imago state and emerge during the first warm spell in spring. Earliest date for *B. ultramarina* is IV-19, collected at Westville.

Mr. Laurent stated he had a male specimen of *Deilephila lineata* to emerge on Oct. 23rd. Said he had never in his experience had any species of Sphingidae emerge later than Oct. 1st when pupae had been kept out of doors. The several days of warm weather we had at that time was supposed to account for this.

Dr. Castle inquired about baking insects to quickly dry and set them. Said he had put light brown specimens of *Donacia picastrix* in oven where temperature was very high and had been called away and when the specimens were taken out, 28 hours later, they were bright green in color. These were exhibited. This was discussed by the members, Mr. Haimbach stating he treated all his specimens this way without harm except putting a sheen on the wings of Odonata and said it was very good when collecting at the shore where air was continually moist; insects dried in the regular way there were noticed to droop their wings in a couple of weeks' time.

Mr. Harbeck exhibited six species of the Anthomyid genus

Lispa: *consanguinea, sociabilis, polita, uliginosa, albitarsis* and *tentaculata*.. He stated that these flies were found walking around on muddy places and pond lily's leaves. Five species of those shown were new to the New Jersey list, only one species is recorded there and one more has been added in the supplementary list by Mr. Johnson.

GEO. M. GREENE, *Ass't Sec'y.*

A meeting of the Newark Entomological Society was held in Turn Hall, September 13, with fifteen members present.

Mr. Broadwell spoke of the invasion of *Ennomos subsignarius* in Newark last July. Discussion brought out the fact that the insects occurred as far north from New York City as Oliverea, Ulster County, N. Y.; westward as far as Paterson, N. J., where they were equally as numerous as in Newark and New York; eastward as far as New Haven, Conn.; and southward to New Brunswick and Morgan, N. J. At both of these southern points only a single specimen was taken.

Prof. Smith stated that *Zeuzeura pyrina* was extending its range southward in New Jersey, and was now found in some numbers at Maurer and Eatontown. He also said that reports claimed it to be injurious in the vicinity of Boston.

Mr. Grossbeck spoke of the abundance of *Arsilonche albovenosa* larvae present on the cat-tail marshes near Snake Hill in 1907. Thousands of larvae were spread over several acres of territory and three to six individuals were found on every blade of the plant. Search in the fall of the year resulted in the finding of only two cocoons spun in among the sheaths. Nothing was found on the ground or under the various objects on the meadow. Parasitism was small if not altogether absent since of the hundred or more larvae brought into the laboratory, none were infested. The question arises as to what became of these larvae?

Mr. Herpers spoke of the numerous gorgeous butterflies he had seen in Topeka, Mexico, last winter, where he had been led to believe they were scarce at that season of the year. Many species were represented.

The October meeting of the Newark Entomological Society was held on the 18th of the month, at Turn Hall, with twenty-three members and five visitors present. Mr. R. P. Dow, of Brooklyn, was elected a member. Following the meeting the members and guests proceeded to the dining hall, where a collation was served in honor of the twenty-fourth anniversary of the society. Speeches were made by Prof. Smith and Messrs. Beutenmüller, Leng, Davis, Dow and Kearfott, and music was furnished by Prof. Wormsbacher.

A meeting of the Newark Entomological Society was held at Turn Hall on November 8th, with twelve members present. Prof. Wormsbacher reported *Nonagria oblonga* Grt. from Jersey City, Homestead and Guttenberg, N. J., in August. He said the species was abundant around the electric light. He also reported the capture of *Acronycta radcliffei* and *Mamestra purpurissata* at Edgewater Heights, the former on June 29, the latter on September 7, and *Hypocala hillii* at Guttenberg on September 15. A friend of his captured a battered specimen of *Papilio palamedes* Dru. at Fairview on July 8, this being the most northern point from which the species has been recorded and a new record for New Jersey. According to Holland this species does not extend north of Southern Virginia or Missouri.*

Mr. Buchholz spoke of the larvae of *Gloveria arizonensis* that he found hiding in a cedar stump in Arizona. The stump was reduced almost to dust by borers, leaving only a fragile framework. They were of two sizes, the larger ones maturing the same year, the smaller ones hibernating and producing imagoes the following year. This habit of requiring two years to complete their development was later demonstrated to be the regular practice of the species. Mr. Buchholz also reported *Dilophonota alope* Dru. from Elizabeth, N. J., September 27.

Mr. Bischoff reported the capture of two specimens of *Neoclytus jouteli* at Lakehurst, N. J., on July 4, 1907, and three

* Philadelphia by Skinner.

specimens at Rahway, N. J., on August 2, one of the latter taken by Mr. Grossbeck. Aside from these five examples the species is known only by the unique type described by Mr. Davis.

Mr. Grossbeck exhibited a cocoon of *Tropaea luna* which was spun in the neck of a bottle, completely corking up the mouth and projecting about three-eighths of an inch over the top.

JOHN A. GROSSBECK, *Secretary.*

ALEXANDER CRAW.

The following resolutions on the death of Alexander Craw, were presented by the Executive Committee and unanimously adopted by the Hawaii Entomological Society.

Whereas, The Hawaiian Entomological Society has learned with profound sorrow of the death of its esteemed member, Alexander Craw, June 28, 1908, be it therefore

Resolved, That the Society, through its Secretary, transmit to the bereaved family its deepest sympathy, and this expression of its appreciation of the irreparable loss sustained. Mr. Craw was one of the founders of the Society; was its first Vice-President and always took a keen interest in the Society, attending the meetings faithfully unless prevented by matters of health or duty and was ever ready to join in the discussions of practical entomological interest. He was a sincere, kind, generous, and hospitable man, and in the few years spent in our midst had endeared himself into the hearts of all with whom he was associated.

Be it further Resolved, That these resolutions be spread on the minutes of the Society.

An interesting biographical sketch of Alexander Craw was published by Jacob Kotinsky in the Proc. Haw. Ent. Soc., II, No. 1, Oct., 1908.

OTTO H. SWEZEY,
R. C. L. PERKINS,
JACOB KOTINSKY,
Executive Committee.

EXCHANGES.

Not Exceeding Three Lines Free to Subscribers.

☞ These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Wanted for Cash or exchange living pupae *Papilio turnus, troilus, philenor* at 5c. each; *excaecatus, geminatus, myops* at 5c. each; *modesta* 10c. each; *lineata* at 5c., *jorulla* at 7c., *Dat. nimistra* at 5c.—A. F. Porter, Decorah, Iowa.

I have larvae of *Catocala illecta* feeding on honey-locust, and shall have chrysalids in a few weeks. From eggs of *C. piatrix* and *C. vidua* shall soon have larvae. Larvae of other later. Want *C. parta* and *C. amatrix*.—R. R. Rowley, Louisiana, Mo.

Lepidoptera Wanted.—Catocala, Papilio, Arctians and other showy specimens of larvæ. Will send equally good things in return.—G. Eberhard, Berlin, Friedenau, Beckerstrasse t. Germany.

I offer bred Gortynas, fine butterflies, chrysalids of butterflies, hawkmoths, etc., and *Catocala* and other eggs. I want *Catocala* eggs, chrysalids of *ajax, turnus, asterias, troilus, cresphontes*, etc., or of any butterfly or hawkmoth or offers welcomed.—J. W. H. Harrison, 181 Abingdon Rd., Middlesbro', England.

I want to buy cocoons of *A. luna, A. angulifera* and *gloveri*. Pupae of *P. achemon* and *D. lineata*. Please state prices.—Sydney L. Wright, Jr., Logan, Philadelphia.

Fresh mounted examples of Macro- and Micro-lepidoptera from this locality offered in exchange for Macro-lepidoptera of North America new to my collection.—Fred. Marloff, Oak Station P. O., Alleg. Co., Pa.

Geometridae.—Will exchange or pay cash. Wanted especially in series *Eupthecias* from Maine and the Provinces, Canada and the Northwest, also western, southwestern and southern forms.—Address R. F. Pearsall, 1334 Dean St., Brooklyn, N. Y.

Liberal exchange in European and Missouri Lepidoptera for exotics and natives not in my collection.—Aug. Knetzger, 3822 McDonald St, St. Louis, Mo.

Fertile eggs of *Catocala ilia, neogama, piatrix, robinsoni, vidua, retecta, innubens, cara* and *amatrix*. For sale or exchange.—George M. Dodge, Louisiana, Mo.

Specimens of Lepidoptera for exchange from this locality.—Fred. Burns, 636 Center St., Reno, Nevada.

Lepidoptera from the State of Missouri. Papered specimens in good condition. Write for list.—F. Malkmus, 4398½ G Gilson Avenue, St. Louis, Mo.

Wanted for cash or exchange Meloidae, especially of genus *Meloe*, from North America north of Mexico.—R. W. Dawson, Dept. Ent., Univ. of Neb., Lincoln, Nebraska.

Lepidoptera.—I would like to correspond with those who expect to collect for cash in new and little known regions, South and West, during the coming season.—John L. Healy, 312 City Hall, Chicago, Ill.

I'll be happy in corresponding and exchanging papers and material of study with economic entomologists, and especially with Miriopodologists and Acarologists.—Prof. Carlos E. Porter, Casilla 2352, Santiago, Chile.

For Exchange.—A subscription to the Macrolepidoptera of the world by Seitz. All parts complete to date.—Chris. E. Olsen, No. 1 Jefferson Ave., Maspeth, L. I., N. Y.

Some Entomological Literature for exchange.—M. Bubna, 2629 Woodhill Rd., Cleveland, Ohio.

Wanted for Cash or Exchange.—Cocoons and pupae: *Pap. ajax, troiulus, cresphontes, achemon, turnus* and other *Papilio. T. modesta, H. chersis, luscitiosa. A. bicolor, angelica, P. pandorus, Dar. versicolor, Cal. astylus, Cit. regalis, imperialis, hylacus, luna, polyphemus, Lapara coniferarum, C. nudulosa, S. germinatus, Paonias myops, P. quinquanmaculata, Attacus cecropia, jorulla, orizaba angulifera* and all other species of *Attacus.*—Joseph Sever, 335 E. 49th St., New York City.

Wanted.—Henshaw's Check List of Coleoptera. Will pay cash.—R. S. Woglum, Whittier, California.

Cordalis cornuta larvae.—I desire to purchase in quantity "dobsons" in alcohol or formaline, or preferably in chloral hydrate (see Comstock and Kellogg, Insect Anatomy, p. 29). Please state price desired.—J. F. Abbott, Washington University, St. Louis, Mo.

Would like to exchange Coleoptera for Hymenoptera.—J. J. Baumberger, 22 Lyn St., San Francisco, Cal.

Wanted—Two male and two female *Argynnis diana* with data. Fresh perfect specimens only. Will pay cash.—William Place, Jr., 13 Parkis Ave., Providence, R. I.

Bred specimens of *Anaea andria* in papers and of *Catocala illecta* on pins. Other Catocalae, *Papilio cresphontes* and pupae of Papilios, Sphinges and Bombycids for exchange.—R R. Rowley, Louisiana, Mo.

For exchange—*Panorpa rufa, lugubris, americana.* Fulgoridae—*Priocera fuliginosa.* Hymenoptera—*Megacilissa electa.* Scarabidae—*Bradycinetus ferrugineus.*—A. H. Manee, Southern Pines, N. C.

Complete lists of North American insects of all orders for exchange, furnished on application.—Charles H. Withington, Kansas University, Lawrence, Kansas.

For exchange—Mexican moths, principally Sphingidae; wish the larger western butterflies in exchange.—W. R. Walton, 810 N. 18th St., Harrisburg, Pa.

Italian Macro Lepidoptera.—Perfect spread specimens accurately determined are offered in exchange for North American Macro Lepidoptera.—Giacinto Gianelli, Rivoli, Tornise, Italy.

Wanted.—*Elateridae* and *Buprestidae* from all parts of North America. Will give in exchange named Coleoptera and Lepidoptera (diurnals, in papers) —C. O. Houghton, Delaware College, Newark, Delaware.

Wanted for Cash.—Insect Life, Vol. i, Nos. 2, 5, 11, 12; Vol. iii, Nos. 11, 12. Psyche, Vol. xii, No. 2. Fntomological News, Vol. xv, No. 4. State price.—Wm. S. Marshall, 116 E. Gorham Street, Madison, Wis.

I have for exchange cocoons and pupae of *tityrus, D. myron, A. actomaculata, P. sexta, Ph. achemon.* Wish to exchange with collectors from California, Arizona and New Mexico. Also material from Europe and other duplicates. "Skeemers are not wanted."—J. N. Lang, 104 Bunker St., Chicago, Ill.

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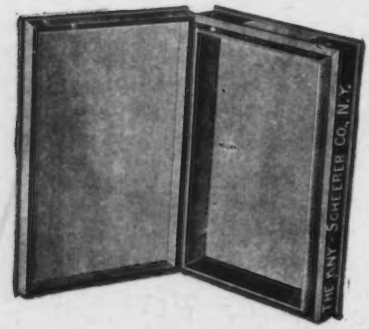

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